SAN FRANCISCO PUBLIC LIBRARY
3 1223 07661 6607

L12

San Francisco Public Library

Government Information Center
San Francisco Public Library
100 Larkin Street, 5th Floor
San Francisco, CA 94102

REFERENCE BOOK

Not to be taken from the Library

Digitized by the Internet Archive
in 2016

https://archive.org/details/bayarearapidtran1987sanf

DRAFT

BAY AREA RAPID TRANSIT DISTRICT

[Short Range Transit Plan]

1987 FIVE YEAR PLAN

VOLUME I

OPERATIONS AND SERVICE PLAN

July 1987 – June 1992

DOCUMENTS DEPT.

APR 23 1987

SAN FRANCISCO
PUBLIC LIBRARY

APRIL 1, 1987

3 1223 07661 6607

DRAFT

1987
BAY AREA RAPID TRANSIT DISTRICT
FIVE YEAR PLAN

FOR THE PERIOD JULY 1987 THROUGH JUNE 1992

The preparation of this report has been financed in part through a grant from the United States Department of Transportation, Urban Mass Transportation Administration under the Urban Mass Transportation Act of 1964, as amended, as passed through the Metropolitan Transportation Commission.

The contents of this report reflect the views of BART, which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the original views or policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation.

April 1, 1987

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

BOARD OF DIRECTORS

Margaret K. Pryor
President

Barclay Simpson
Vice President

Robert S. Allen

Nello Bianco

John Glenn

John H. Kirkwood

Arthur J. Shartsis

Arlo H. Smith

Wilfred T. Ussery

Keith Bernard
General Manager

Department of Planning, Budget and Research
Bay Area Rapid Transit District
800 Madison Street
Oakland, California 94607

TABLE OF CONTENTS

VOLUME I: OPERATIONS AND SERVICE PLAN

SUMMARY (To Be Included In Final Document)

INTRODUCTION

1 BART Background and Five Year Plan Purpose
1 District Organizational Overview
4 Current System and Service Overview

CHAPTER I: PLANNING ISSUES

6 Future Demand Projections
20 New Peak Service Capacity
30 Service Quality
32 Cost Effectiveness and Productivity
35 Program Delivery
35 Extensions
35 Maintenance Requirements
36 Express Bus Effectiveness and Productivity
36 Energy Contingency Requirements
37 Capital Investment Planning
37 Privatization
37 Disadvantaged and Women Business Enterprise
37 Five Year Planning

CHAPTER II: PERFORMANCE EVALUATION AND SERVICE IMPROVEMENTS

39 Car Availability
46 Scheduled Train Dispatches Completed
48 Service Delays
51 Transbay Throughput
53 Patron On-time Performance
55 Automatic Fare Collection System
57 Ridership
67 Financial Performance
77 Program Area Objectives

CHAPTER III: FIVE YEAR OPERATING FINANCIAL PLAN

84 FY 1987/88 Operating Budget
86 Anticipated Growth Rates
87 Additional Staffing Requirements
87 Five Year Operating Budget Plan

ATTACHMENT: PUBLIC COMMENT (To Be Included in Final Document)

SUMMARY

(To Be Included in Final Document)

INTRODUCTION

BART BACKGROUND AND FIVE YEAR PLAN PURPOSE

The BART District was formed in 1957 by the State Legislature in response to Bay Area growth forecasts and related future transportation needs. A variety of unanticipated problems emerged following the start up of revenue operations which began in September 1972. Since that time, efforts have been directed toward improving system reliability and increasing capacity, the result of which has been significantly improved train service.

BART's 1987 Five Year Plan presents a strategy for continued progress for achieving a greater share of the system's potential for serving Bay Area travel needs. The plan is the result of an ongoing process involving the District Board of Directors and management for the purpose of identifying future capital and financial requirements.

The document is divided into two separately bound volumes. These are: the Operations and Service Plan and the Capital Improvement Program. The Operations and Service volume identifies key issues and assumptions either carried over from the previous planning cycle or those which have more recently emerged. These concerns are then incorporated into an evaluation of system performance and service improvements section of Volume I. The District's key performance indicators and policy framework provide the structure for this discussion. The final section of Volume I presents the District's financial strategy for supporting planned operations and service. The details pertaining to the capital projects required for the delivery of planned service are provided in Volume II: Capital Improvement Program. Capital budget requirements and projected funding availability by source are presented along with additional details for selected capacity expansion, parking, and extension projects.

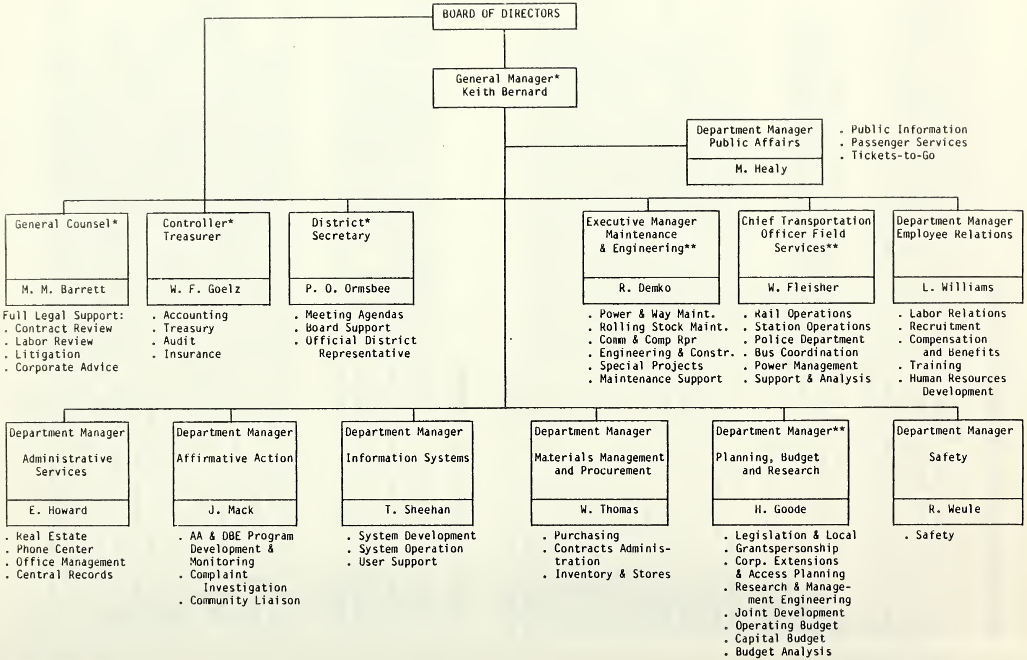
DISTRICT ORGANIZATIONAL OVERVIEW

Current BART organization reflects a management structure which has evolved to effectively carry out District programs and policies. As shown in Figure 1, thirteen department managers report directly to the General Manager who in turn reports to a nine-member elected Board. As Board appointed officers, three of the department managers also report directly to the Board of Directors. These are the General Counsel, Controller/Treasurer, and District Secretary.

As the legislative body of the District, the Board of Directors establishes BART policy. In accordance with BART's mission statement, the Board of Directors reviews and adopts a set of goals and objectives each year reflecting District needs which have been grouped into nine program areas (see Figure 2 for the mission statement and goals and Figures 40 and 41 in Chapter II for objectives). This process is part of the annual budget and five-year planning cycle, and serves to guide management in budgeting for and organizing BART's labor force (consisting of approximately 2,250 employees) so that desired levels of performance may be achieved. Additionally, progress towards implementing important programs and capital improvements is continually monitored and reviewed. Other projects continue to be identified as part of this process in an effort to improve BART's effectiveness and operating performance even further. The Project Review Board, composed of key department managers, plays an important role in this process by recommending to the General Manager project priorities based on staff analysis and evaluation of District needs.

Figure 1

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT



* Board Appointee
**Project Review Board

Figure 2

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT POLICY

PREAMBLE TO DISTRICT GOALS AND OBJECTIVES

Based on the 1957 BART Commission Report, the statutes that created BART, the 1962 Composite Report, and principles of prudent business management, it is the policy of the San Francisco Bay Area Rapid Transit District to:

1. Maximize the effectiveness and efficiency of its operations and bring the system to its full potential.
2. Maximize the return on its investments in property, rights-of-way, and facilities.
3. Expand its service area to become the operator of an integrated regional trunk-line transit system which effectively serves interested counties in the Bay Area.

DISTRICT GOALS

1. Operate scheduled 4-route weekday service with route headways of 15 minutes or less during peak and midday periods and expand service within feasible, technical, and financial limits including improved peak-hour frequency of service and capacity where needed.
2. Improve the reliability performance of the present BART system.
3. Continue to improve BART system and patron safety and emergency preparedness.
4. Increase system utilization by promoting BART travel for all purposes with special emphasis on offpeak and reverse commute trips.
5. Fund and implement the necessary capital improvements and replacements to the system.
6. Operate within available funds without incurring an unfunded deficit.
7. Maximize the contribution to operating costs from passenger revenues, consistent with reasonable fare levels, to achieve a farebox ratio above 50%.
8. Make every effort to achieve District objectives for female and minority employment and minority business enterprise participation.
9. Improve system access by means of a comprehensive program of parking expansion, BART feeder services, transit coordination, and special projects addressing elderly and handicapped mobility.
10. Develop station area sites for the realization of increased patronage and revenues, and to enhance the communities BART serves.
11. Extend BART trunk lines within Bay Area travel corridors where feasible and in support of regional land use policies.

CURRENT SYSTEM AND SERVICE OVERVIEW

The BART system contains 34 stations, 9 of which are in the Westbay and 25 in the Eastbay. Trains operate over 3 Transbay and 1 Eastbay routes on a total of 71 miles of double mainline track. Trains are formed and dispatched from three maintenance yards located in the Eastbay. The central train control computer at the Lake Merritt Administration Building maintains overall supervision of train movements. (Additional system description and service information is provided in "BART FACTS" located on the inside front and back covers.)

Trains can travel up to 80 miles per hour. Normal operations are based on a 72 mile per hour maximum which results in an average system speed of 32.7 miles per hour including station stops. Regular adult fares and travel times for the rail system are presented below.

The components of BART's fare structure are summarized in Figure 3.

Fares

	Balboa Park	Glen Park	24th St. Mission	16th St Mission	Civic Center	Powell	Montgomery	Embarcadero	Oakland West	Concord	Pleasant Hill	Walnut Creek	Lafayette	Orinda	Rockridge	Richmond	El Cerrito Del Norte	El Cerrito Plaza	North Berkeley	Berkeley	Ashby	MacArthur	19th St Oakland	Oak. City Ctr. 12th St.	Lake Merritt	Fruitvale	Coliseum	San Leandro	Bay Fair	Hayward	South Hayward	Union City	Fremont
Daly City	1.30	1.30	1.30	1.30	1.45	1.45	1.45	1.45	1.85	2.85	2.70	2.60	2.45	2.25	2.00	2.35	2.25	2.15	2.10	2.05	2.00	1.95	1.90	1.90	1.90	2.05	2.15	2.25	2.35	2.50	2.65	2.85	3.00
Balboa Park		0.80	0.80	0.80	0.80	0.80	0.80	0.80	1.75	2.80	2.60	2.55	2.40	2.20	1.95	2.30	2.20	2.10	2.00	2.00	1.95	1.90	1.85	1.85	1.85	2.00	2.05	2.20	2.30	2.45	2.60	2.80	2.35
Glen Park			0.80	0.80	0.80	0.80	0.80	0.80	1.70	2.80	2.60	2.50	2.35	2.15	1.90	2.25	2.15	2.10	2.00	1.95	1.90	1.85	1.80	1.60	1.80	1.95	2.05	2.15	2.30	2.40	2.55	2.75	2.95
24th St. Mission				0.80	0.80	0.80	0.80	0.80	1.55	2.70	2.50	2.45	2.30	2.10	1.85	2.20	2.10	2.00	1.90	1.90	1.85	1.75	1.65	1.65	1.65	1.85	1.95	2.10	2.20	2.35	2.50	2.70	2.85
16th St Mission					0.80	0.80	0.80	0.80	1.55	2.70	2.50	2.45	2.25	2.10	1.80	2.15	2.05	2.00	1.90	1.85	1.80	1.70	1.60	1.60	1.60	1.80	1.95	2.10	2.20	2.30	2.45	2.70	2.85
Civic Center						0.80	0.80	0.80	1.40	2.65	2.45	2.40	2.25	2.05	1.75	2.10	2.00	1.95	1.85	1.80	1.75	1.60	1.55	1.55	1.55	1.75	1.90	2.05	2.15	2.30	2.40	2.65	2.80
Powell							0.80	0.80	1.40	2.65	2.45	2.40	2.25	2.05	1.75	2.10	2.00	1.95	1.85	1.80	1.75	1.60	1.55	1.55	1.55	1.75	1.90	2.05	2.15	2.30	2.40	2.65	2.80
Montgomery								0.80	1.40	2.65	2.45	2.40	2.25	2.05	1.75	2.10	2.00	1.95	1.85	1.80	1.75	1.60	1.55	1.55	1.55	1.75	1.90	2.05	2.15	2.30	2.40	2.65	2.80
Embarcadero									1.40	2.65	2.45	2.40	2.25	2.05	1.75	2.10	2.00	1.95	1.85	1.80	1.75	1.60	1.55	1.55	1.55	1.75	1.90	2.05	2.15	2.30	2.40	2.65	2.80
Oakland West										1.90	1.70	1.65	1.45	1.15	0.80	1.35	1.20	1.10	0.95	0.85	0.80	0.80	0.80	0.80	0.80	0.80	0.95	1.15	1.35	1.50	1.65	1.90	2.05
Concord											0.80	0.80	0.80	0.80	1.75	2.10	2.00	1.95	1.85	1.85	1.80	1.80	1.85	1.85	1.85	1.90	2.00	2.15	2.25	2.35	2.50	2.75	2.90
Pleasant Hill												0.80	0.80	0.80	1.55	1.95	1.85	1.75	1.65	1.65	1.60	1.60	1.65	1.65	1.65	1.70	1.80	1.95	2.05	2.20	2.30	2.55	2.70
Walnut Creek													0.80	0.80	1.40	1.85	1.75	1.70	1.60	1.55	1.55	1.55	1.55	1.55	1.55	1.65	1.75	1.85	2.00	2.10	2.25	2.45	2.65
Lafayette														0.80	1.15	1.70	1.60	1.50	1.45	1.40	1.30	1.25	1.35	1.35	1.35	1.50	1.55	1.70	1.80	1.95	2.10	2.30	2.45
Orinda															0.80	1.50	1.40	1.30	1.15	1.10	1.00	0.80	1.05	1.05	1.05	1.20	1.40	1.55	1.65	1.75	1.90	2.15	2.30
Rockridge																1.20	1.05	0.90	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.85	1.00	1.20	1.40	1.55	1.65	1.90	2.05
Richmond																	0.80	0.80	0.80	0.80	0.80	1.20	1.30	1.30	1.30	1.45	1.55	1.65	1.80	1.90	2.05	2.30	2.45
El Cerrito Del Norte																		0.80	0.60	0.80	0.80	1.00	1.10	1.10	1.10	1.35	1.45	1.60	1.70	1.80	1.95	2.20	2.35
El Cerrito Plaza																			0.80	0.80	0.80	0.90	1.00	1.00	1.00	1.20	1.35	1.50	1.60	1.75	1.90	2.10	2.25
North Berkeley																				0.80	0.20	0.80	0.80	0.80	0.80	1.05	1.20	1.40	1.50	1.65	1.80	2.00	2.15
Berkeley																					0.80	0.80	0.80	0.80	0.80	1.00	1.15	1.35	1.50	1.65	1.75	2.00	2.15
Ashby																						0.80	0.80	0.80	0.80	0.90	1.05	1.30	1.45	1.60	1.75	1.95	2.10
MacArthur																							0.80	0.80	0.80	0.80	0.95	1.20	1.35	1.55	1.65	1.90	2.05
19th St Oakland																								0.80	0.80	0.80	0.80	1.10	1.25	1.50	1.60	1.85	2.00
Oak. City Ctr. 12th St.																									0.80	0.60	0.80	1.10	1.25	1.50	1.60	1.85	2.00
Lake Merritt																										0.80	0.80	1.10	1.25	1.50	1.60	1.85	2.00
Fruitvale																											0.80	0.80	1.05	1.25	1.50	1.70	1.90
Coliseum																												0.80	0.80	1.10	1.35	1.65	1.80
San Leandro																													0.60	0.80	1.10	1.45	1.65
Bay Fair																														0.80	0.80	0.80	0.80
Hayward																															0.80	0.80	0.80
South Hayward																																0.80	0.80
Union City																																	0.80

Time

	Daly City	Balboa Park	Glen Park	24th St. Mission	16th St Mission	Civic Center	Powell	Montgomery	Embarcadero	Oakland West	Concord	Pleasant Hill	Walnut Creek	Lafayette	Orinda	Rockridge	Richmond	El Cerrito Del Norte	El Cerrito Plaza	North Berkeley	Berkeley	Ashby	MacArthur	19th St Oakland	Oak. City Ctr. 12th St.	Lake Merritt	Fruitvale	Coliseum	San Leandro	Bay Fair	Hayward	South Hayward	Union City
Balboa Park	5																																
Glen Park	7	3																															
24th St. Mission	10	6	4																														
16th St Mission	13	8	6	3																													
Civic Center	15	11	9	5	3																												
Powell	17	13	10	7	5	2																											
Montgomery	19	15	12	9	7	4	2																										
Embarcadero	21	16	14	11	8	6	4	2																									
Oakland West	28	24	21	18	16	13	11	10	8																								
Concord	68	63	61	57	55	53	51	49	47	40																							
Pleasant Hill	62	57	54	51	49	46	45	43	41	34	7																						
Walnut Creek	58	54	51	48	46	43	41	40	38	30	10	4																					
Lafayette	53	49	46	43	41	38	36	35	33	25	15	9	6																				
Orinda	48	43	41	37	35	33	31	29	27	20	21	14	11	6																			
Rockridge	41	37	34	31	29	26	25	23	21	14	27	21	17	12	7																		
Richmond	59	55	52	48	46	43	41	40	38	30	51	45	42	37	31	25																	
El Cerrito Del Norte	55	50	47	44	42	39	37	35	34	26	47	41	38	33	27	21	5																
El Cerrito Plaza	51	47	44	41	38	36	34	32	30	23	44	38	35	30	24	18	8	4															
North Berkeley	48	43	40	37	35	32	30	28	27	19	40	34	31	26	20	14	12	7	4														
Berkeley	45	40	38	34	32	29	27	26	24	16	37	31	28	23	17	11	15	10	7	3													
Ashby	42	38	35	31	29	26	25	23	21	13	34	28	25	20	14	8	17	13	10	6	3												
MacArthur	38	34	31	28	26	23	21	19	18	10	30	24	21	16	10	4	21	17	14	10	7	4											
19th St Oakland	34	30	27	24	22	19	17	16	14	7	34	28	25	20	14	8	25	20	17	13	11	8	4										
Oak. City Ctr. 12th St.	32	28	26	22	20	18	16	14	12	5	36	29	26	27	16	9	28	22	19	15	12	10	6	2									
Lake Merritt	33	29	26	23	21	18	16	15	13	5	39	33	30	25	19	12	30	25	22	18	16	13	9	6	4								
Fruitvale	38	34	31	28	26	23	21	19	18	10	43	37	34	29	23	17	34	30	26	23	20	17	13	10	8	5							
Coliseum	42	37	35	31	29	27	25	23	21	14	47	41	38	33	27	20	37	33	30	26	23	20	17	13	11	8	4						
San Leandro	48	41	39	35	33	31	29	27	25	18	51	45	42	37	31	24	42	37	34	30	28	25	21	17	16	12	8	5					
Bay Fair	50	45	43	40	37	35	33	31	30	22	55	49	46	41	35	29	46	41	38	34	32	29	25	21	20	16	12	9	5				
Hayward	55	50	47	44	42	40	38	36	34	27	59	53	50	45	39	33	50	46	42	39	36	33	29	26	24	21	16	13	9	5			
South Hayward	59	54	52	48	46	44	42	40	38	31	63	57	54	49	44	38	54	50	47	43	40	37	33	30	29	25	21	17	13	9	5		
Union City	64	59	57	54	52	49	47	46	44	36	69	63	60	55	49	43	60	55	52	48	45	43	39	35	34	30	26	23	18	14	10	6	
Fremont	69	65	62	58	56	54	52	50	49	41	74	68	65	60	54	48	64	60	57	53	50	47	44	40	38	35	31	27	23	19	15	11	5

Figure 3

BART FARE COMPONENTS AND TICKET PRICES

TRIP LENGTH:	Up to 6 Miles	$0.80
	Between 6 and 14 Miles[1]	$0.92 + 0.069/Mile
	Over 14 Miles	$1.47 + 0.041/Mile
SURCHARGE:	Transbay	$0.45
	Daly City[2]	$0.52
SPEED PREMIUM:	Extra Charge for Faster (or fare reduction for slower) Than Average Trips; Based on Scheduled Travel Time	+/- $0.025/Minute
RESULTING FARES:[3]	Range	$0.80 to $3.00
	Average[4]	$1.69
SPECIAL FARES[5] & DISCOUNTED TICKETS:	Children Under 5 (No Charge)	$0.00
	Children 5 to 12 (90% Discount)	$1.60 ($16.00 Value)
	Persons 65 and Over (90% Discount)	$1.60 ($16.00 Value)
	Qualifying Handicapped (90% Discount)	$1.60 ($16.00 Value)
	Regular Adult (6.25% Discount)	$30.00 ($32.00 Value)
	Excursion (Entry/Exit, Same Station)	$2.60
SEMI-MONTHLY PASS[6]	BART ticket combined with AC Transit semi-monthly pass (unlimited use)	8 denominations from $20.00 to $53.00
PASSES:[7]	Unlimited monthly BART/MUNI Travel Within San Francisco	$23.00
EXPRESS BUS: (1 Zone/2 Zone)	Children Under 5 (No Charge)	$0.00
	Children 5-12	$0.15/$0.30
	Regular Adult	$0.75/$1.15
	Persons 65 and Over	$0.15/$0.30
	Qualifying Handicapped	$0.15/$0.30
TRANSFERS:	BART Express Bus (Leaving Rail Station)	$0.75 Value
	SF MUNI (Per MUNI Round Trip)	$0.75 Value
	AC Transit (Per AC Round Trip) -- Peak[8]	$0.30 Value
	Off-Peak	$0.70 Value

NOTES:

1. Trips over 6 miles within Eastbay Suburban Zone (Concord-Orinda, Fremont-Bayfair, Richmond-Ashby) priced at fare indicated for trips under 6 miles.
2. Does not apply to Transbay trips.
3. Resulting fares are rounded to nearest 5¢ and encoded in Automatic Fare Collection equipment.
4. Weighted by all BART-ticketed trips (excludes BART/MUNI pass trips) which average 13.9 miles.
5. Discounted multiple-ride tickets are sold at BART ticket outlets and are not available in stations.
6. Includes last ride bonus feature on BART which allows any trip if remaining balance equals 5¢. Demonstration program effective February 1987.
7. The joint BART/MUNI pass is available at all San Francisco MUNI pass outlets.
8. Weekdays 6AM - 9AM and 4PM - 7PM.

CHAPTER I

PLANNING ISSUES

The issues identified in last year's Five Year Plan will continue to figure prominently in District planning considerations for the foreseeable future. These are:

- Future Demand Projections
- New Peak Service Capacity
- Service Quality
- Cost Effectiveness and Productivity
- Program Delivery
- System Extensions
- Maintenance Requirements
- Express Bus Effectiveness and Productivity
- Energy Contingency Requirements
- Capital Investment Planning
- Privatization
- Disadvantaged Business Enterprise
- Five Year Planning Process

In the following sections of this chapter, each of these issues will be reexamined in terms of the latest available projections, assumptions, or related information. Based on this discussion, the plan will focus in the next chapter on an assessment of District performance.

FUTURE DEMAND PROJECTIONS

Expectations regarding future ridership levels are perhaps the key consideration in transit short- and long-range planning. Additional emphasis is given to anticipated peak period riding as the determinant of maximum system capacity requirements. Route-by-route growth patterns will influence the distribution of available capacity, and underscore the need for capital improvements. Patronage projections affect staffing and other resource allocation, especially for vehicle maintenance and power requirements. Taken together with estimates of available financial assistance, annual ridership and revenue projections largely determine future expenditure limits. Future demand assessment is, therefore, the starting point in the Five Year Plan process.

What is the outlook for growth of BART patronage during the 1987-1992 planning period? This section provides a review of recent trends, a brief discussion of factors influencing those trends including likely future changes, and a summary of the updated five-year demand forecast.

Recent Trends in BART Ridership*

BART patronage grew steadily between 1981 and mid-1985, except for a temporary decline after the fare increase in September 1982 (Figure 4). Between the winter of 1982-83 and late 1984, it grew at an annual rate of about 9%. From

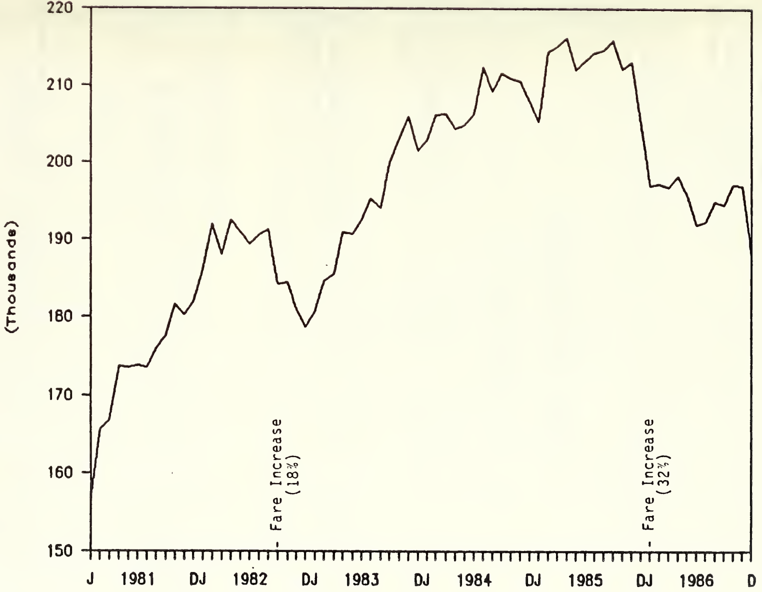
---

*This section is drawn from a more detailed report, "BART Patronage Study," February 1987.

FIGURE 4

AVERAGE WEEKDAY PATRONAGE

(1981 – 1986)



late 1984, the rate of growth continued at a 4% annual rate until April 1985, when it reached an all-time high of 216,155. It then declined slightly through the fall of 1985.

Patronage decreased sharply following the fare increase in January 1986. Between Fall 1985 and Spring 1986, average weekday patronage decreased by 8%. What distinguishes patronage trends following this fare increase from those of previous fare increases is the longer amount of time for growth to resume. Although patronage appears to be recovering by late 1986, it remains almost 8% below its level of Fall 1985, nearly one year after the fare increase.

BART's experience is typical of other major transit operators in California (Figure 5). Most other operators have had fare increases, with resulting decreases in patronage.

Figure 5

PATRONAGE CHANGES FOR SELECTED CALIFORNIA TRANSIT OPERATORS

Patronage Change (%)
(March-April of each year)

	1984-85	1985-86	85/86 FARE CHANGES
AC Transit	-4.5%	-0.1%	Transbay fare increase
Caltrain	2.6	3.4	
Golden Gate Transit	-13.3*	0.1	*10-15% fare increase 20-30% local fare decrease
San Mateo Transit	1.4	-6.8	40% fare increase
Santa Clara Transit	-1.6	-2.7	
Sacramento Regional Transit	0.6	-7.7	33-40% fare increase
Southern California Rapid Transit	6.8	-11.7	70% fare increase
BART	4.4	-8.5	32% fare increase

The greatest decreases in patronage since the Spring 1985 have occurred during the peak periods. Between Spring 1985 and Spring 1986, peak patronage declined by 11% and off-peak by 6%.** The peak accounted for 67% of the patronage, but 83% of the decrease was during the peak.

**For purposes of this study, the peak is defined as 6 to 10 a.m. and 4 to 7 p.m.

As shown in Figure 6, peak patronage began to decline in the latter half of 1985 before the fare increase. Much more significant reductions followed the change in fares. As indicated below, however, other factors besides the fare increase seem to have caused this erosion of peak ridership.

Off-peak patronage was growing at a greater rate than peak patronage before the fare increase. This trend appears to have continued after the change in fares; as indicated in Figure 6, off-peak travel did not decline as much as did that of the peak.

The largest decrease in BART patronage has been in travel to and from San Francisco. For these trips, the percentage decreases were generally larger from areas with larger initial patronage. The largest declines are associated with the longer trips, where the proportional increase in fares was the largest. The greatest single decrease was in trips between the eastern part of the Concord line and downtown San Francisco (down 14%). Large decreases were also observed from Daly City (14%) and southern Alameda county (10%). These areas together account for 40% of the total decrease in peak trips.

Changes in peak travel to and from downtown San Francisco are shown graphically in Figures 7 and 8, for nine major markets comprising Daly City and East Bay stations. It should be noted that, for most of these areas, since Spring 1985 the rate of decrease in the AM peak period is greater than that in the PM peak, indicating an imbalance in use of BART for only the evening commute direction. The imbalance is the greatest for the Contra Costa Central area (Orinda and Lafayette stations), where casual carpooling has been observed to increase over the past year.

After fares were raised in January 1986, average weekday ridership declined until June (see Figure 9). Since then, the trend has reversed and patronage has moved generally upwards through the end of 1986, if December figures are adjusted for the traditionally lower riding during the holiday period. Travel in January 1987 reflects a normal seasonal reduction. By the end of February 1987, BART ridership had begun to exceed 200,000 trips per weekday.

Causes of Patronage Changes

According to the "BART Patronage Study", sources of patronage change were reduced service quality before the fare increase and the fare increase itself. In addition, the decrease in ridership over this period may have been impacted by lower gasoline prices and movement of jobs from San Francisco to suburban areas. A summary of the estimated sources of change in patronage is given in Figure 10.

Patronage in the peak period had been limited by capacity on the three Transbay lines. The work on the KE track during the summer and fall of 1985 delayed service, causing reduced throughput in the Transbay tube. The number of train delay events increased sharply beginning the first quarter of FY 1986 (July - September 1985), and the percentage patron-on-time measure decreased (Figure 11). The Transbay market was most affected by level of service reductions, accounting for 70% of the decrease in patronage between Spring and Fall 1985.

FIGURE 6

WEEKDAY PATRONAGE BY TIME PERIOD

(trips within San Francisco excluded)

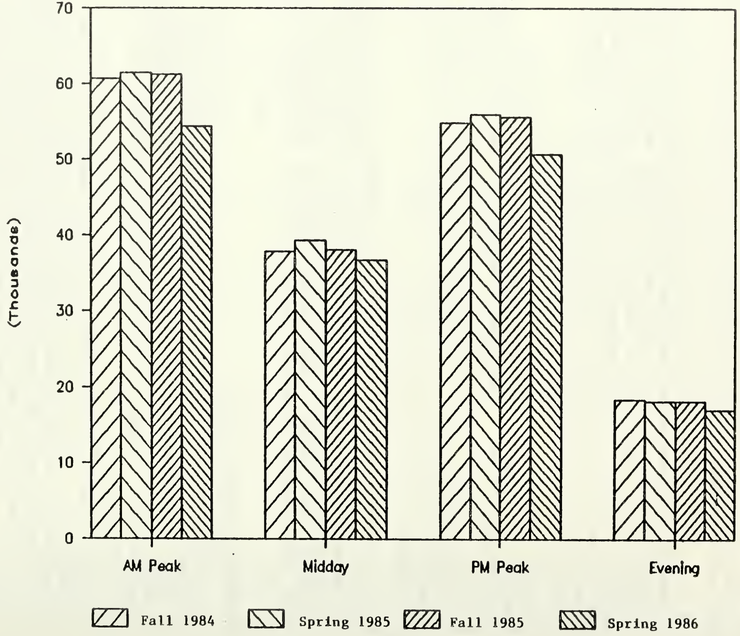


FIGURE 7

AM PEAK TRIPS TO SF CBD

(by major market area)

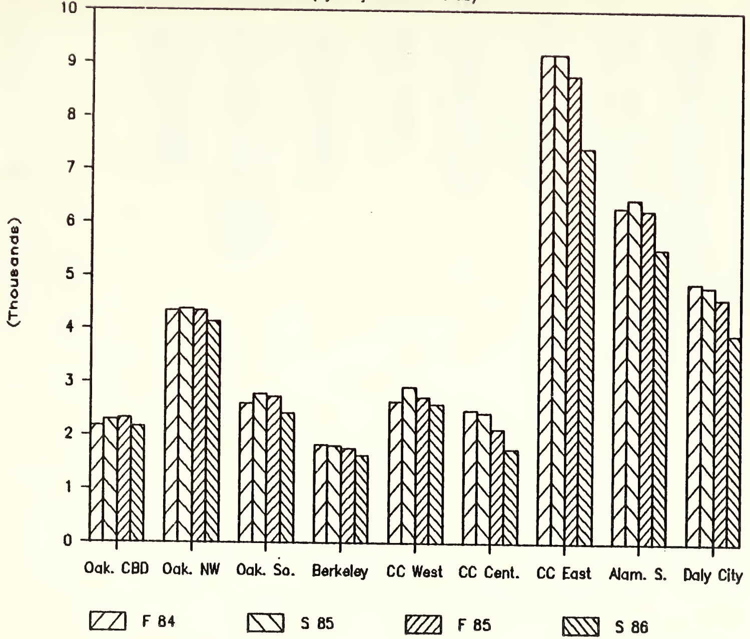


FIGURE 8

PM PEAK TRIPS FROM SF CBD

(by major market area)

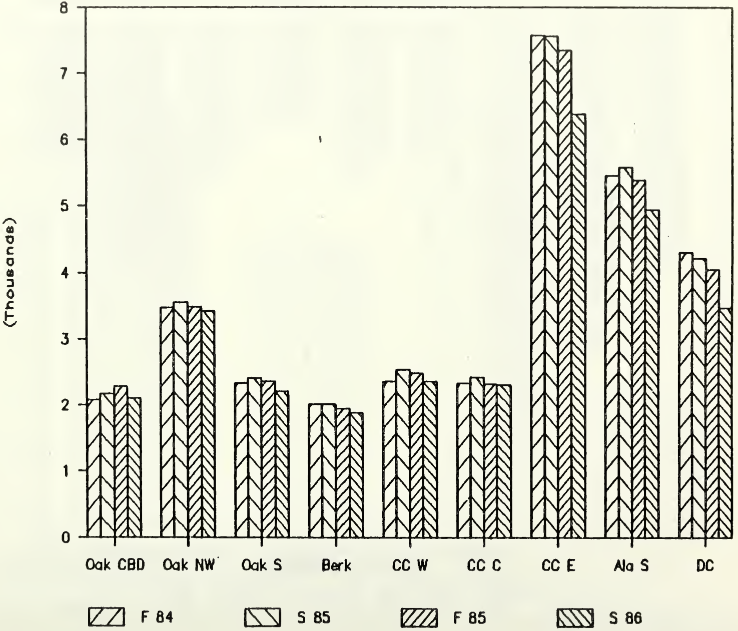


FIGURE 9

AVERAGE WEEKDAY PATRONAGE

(January – February 1987)

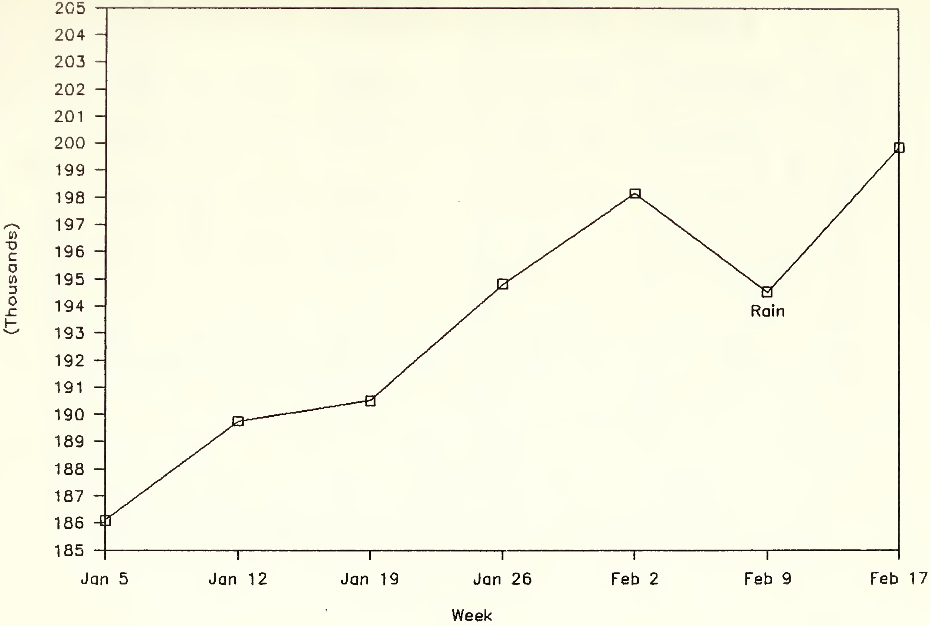


Figure 10

SOURCES OF CHANGE IN BART WEEKDAY PATRONAGE BY MARKET
(Spring 1985 to Spring 1986)

(Thousands of trips)

	Transbay	San Francisco Internal	Daly City	Oakland CBD	Other East Bay	TOTAL
Spring 1985	107.1	40.4	14.6	22.4	31.0	215.4
Spring 1986	98.1	38.3	12.0	19.8	29.0	197.3
Total change	-9.0	-2.1	-2.5	-2.5	-2.0	-18.1
	-8.4%	-5.2%	-17.5%	-11.4%	-6.3%	-8.4%
CHANGE						
Peak*	-7.9		-1.9	-1.3	-1.2	-12.3*
	-10.7%		-17.8%	-9.2%	-6.7%	-10.5%
Off peak*	-1.1		-0.7	-1.2	-0.7	-3.7*
	-1.0%		-16.5%	-15.5%	-5.7%	-6.4%
Total change	-9.0	-2.1	-2.5	-2.5	-2.0	-18.1
% of change in peak	88.3%		73.2%	52.6%	63.0%	77.1%*
FARE INCREASE						
Rideshare/ fare evasion	-1.7	--	--	--	--	-1.7
	-1.6%					-0.8%
Other	-4.4	-2.2	-2.0	-2.1	-3.2	-13.9
	-4.1%	-5.3%	-13.8%	-9.4%	-10.2%	-6.4%
Subtotal	-6.2	-2.2	-2.0	-2.1	-3.2	-15.6
	-5.8%	-5.3%	-13.8%	-9.4%	-10.2%	-7.2%
OTHER						
Service	-0.4	0.0	-0.5	-0.4	0.0	-1.3
	-0.4%	0.0%	-3.7%	-1.9%	0.0%	-0.6%
Rideshare	-0.9	--	--	--	--	-0.9
	-0.8%					-0.4%
Job relocation	-1.5	Not known		--	--	-1.5
	-1.4%					-0.7%
Other	--	--	--	--	1.2	1.2
					3.9%	0.6%
Subtotal	-2.8	0.0	-0.5	-0.4	1.2	-2.5
	-2.6%	0.1%	-3.7%	-1.9%	3.9%	-1.2%

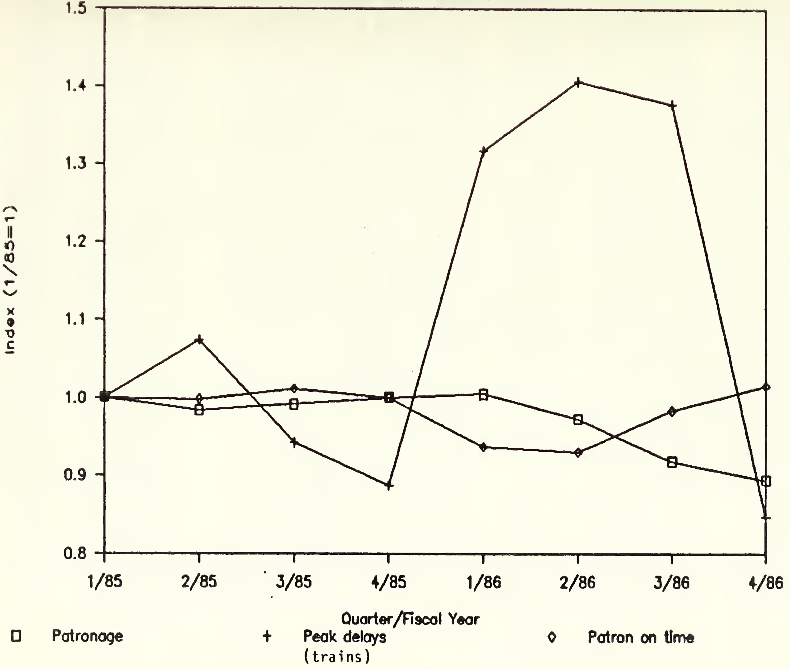
---

*San Francisco internal trips excluded.

FIG 11

SERVICE DELAYS AND PATRONAGE

(by fiscal year quarter)



Much of the decrease in patronage since Spring 1985 can be attributed to the fare increase. The aggregate fare elasticity is about -0.29, which is consistent with transit experience in the U.S.* What is startling is that the elasticity during the peak (-0.35) is markedly greater than during the off-peak (-0.17).** This may be due in part to increased sensitivity to fare increases on the part of peak passengers, some of whom have had to stand. The association between greater elasticities and greater travel distances lends support to this view. BART's peak riders also have higher incomes, and greater access to automobiles than most other transit riders. Furthermore, the reaction to a fare increase may have been greater now than in 1982 in part because the inflation rate is now much lower than it was then.

One reason why patronage has taken longer to recover from the fare increase than it has in the past may be that the fare increase occurred later in the fiscal year than previous fare increases. The summer vacation period may have interrupted any turnaround. Recovery was also hindered by a large decrease in gasoline prices immediately following the fare increase (Figure 12). An earlier decline in gasoline prices, however, does not seem to have had a significant effect on patronage.

There has been a large apparent increase in the use of BART by commuters for only the return trip in the evening peak. Casual carpooling (or other ridesharing) is one likely explanation for this effect. There also appears to be some increase in fare evasion since the fare increase.

The large amount of development in Contra Costa and Alameda Counties has resulted in a number of jobs being relocated from the San Francisco CBD. It is difficult to estimate the effect on BART patronage because of limited information on the timing and source of shifts. The San Francisco Department of Housing and Economic Development has estimated that between 1984 and 1986, about 14,000 to 16,000 jobs have left San Francisco; much of this movement has taken place since the summer of 1985. About 35% of the workers in the San Francisco CBD come from the East Bay; about one-third of these use BART. If these percentages apply similarly to BART commuters to San Francisco, and if half of this decrease occurred between Spring 1985 and Spring 1986, about 1,000 to 2,000 trips per day may have been lost since the summer of 1985 due to job movement out of San Francisco. Relocation of jobs to the East Bay may have caused some increase in commuting opposite to the peak direction. But the patronage data show only a small increase in reverse direction travel during the peak.

---

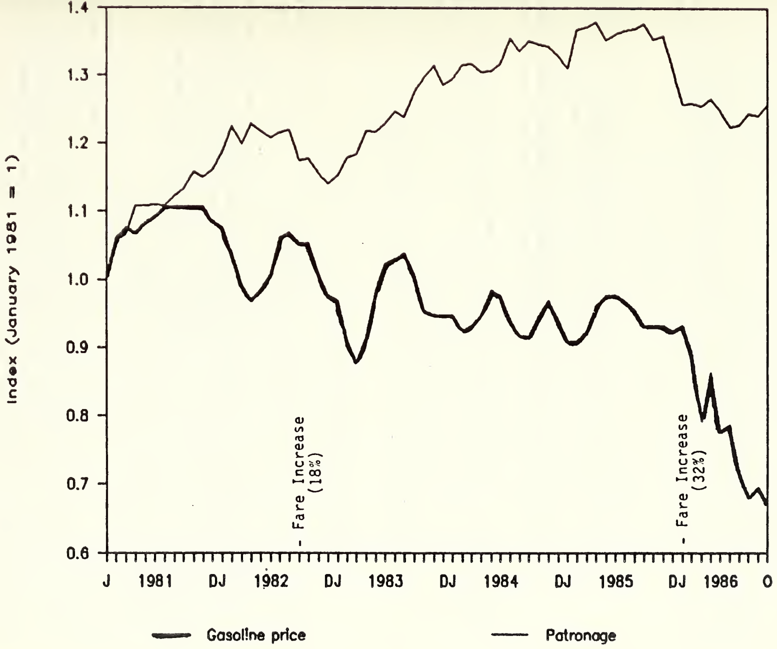
*Transit fare elasticity is defined as the marginal percentage change in demand per percentage change in fare. A market with an elasticity between 0 and -1 is called inelastic, while if the elasticity is lower than -1 it is called elastic. Transit markets are almost always inelastic with respect to fares. If a market is inelastic, an increase in price will bring about an increase in revenue, and a decrease in price will cause revenue to decrease.

**The peak fare elasticity is -0.35±0.03, and the aggregate fare elasticity is -0.29±0.02; the variation is due to uncertainty in the estimate of patronage loss because of job movement out of downtown San Francisco.

FIGURE 12

GASOLINE PRICES AND PATRONAGE

(January 1981 – October 1986)



Peak fare elasticities appear to increase as the percentage change in fare increases. This is contrary to standard transit patronage estimation procedures, in which constant fare elasticities are assumed. This finding indicates that to minimize the effects of fare changes on patronage, it may be preferable to raise fares in more frequent, smaller increments rather than less frequent, larger increments.

Outlook for Future BART Patronage Growth

Demand for BART during the upcoming five-year period is likely to be influenced by the following external factors over which the District has no control:

- Regional growth, especially of employment in San Francisco,
- Changes in service levels and capacity of the regional highway network, especially in corridors parallel to BART,
- Changes in costs associated with commuting by modes other than BART, especially for auto parking and gasoline.

In addition, BART can influence the level of ridership using the system by:

- Adding to peak period capacity,
- Maintaining service quality, especially during peak periods,
- Developing a more comprehensive marketing approach to service planning and delivery.

The outlook for future BART ridership during the 1987-1992 planning period is assessed briefly in terms of each of these factors.

The regional growth trend of most significance to BART demand projections is the growth of employment in the San Francisco and Oakland CBDs, given that BART is radially aligned and most competitive for peak work trips to central locations. According to projections compiled by the Association of Bay Area Governments, employment in San Francisco is expected to grow by about 1 percent annually during the planning period. This rate is the minimum by which peak period demand is expected to grow.

Growth in employment in suburban locations is less likely to create demand for BART because of its lack of concentration in BART corridors and the greater competitiveness of the automobile in serving this market. However, as shown after the recent fare increase, growth in reverse commuting is a strong, if small component of BART peak period travel. Likewise, although the auto is more competitive in this market, most new large suburban developments are actively promoting transit oriented access because of the threat of significant traffic congestion problems.

The existing system of regional highways is at or near capacity on many of the segments which parallel the BART system. It was in recognition of this condition that voters in Alameda County recently approved Measure B which will fund a number of highway and transit improvements over the next 15 years. (A similar measure was defeated in Contra Costa County.) Although this program will provide increased peak period freeway capacity in the long-run, its short-run effect may be to decrease the service level and thus the capacity of these highway segments during the construction period. This factor is likely to increase the effective rate of growth in work trips above the rate noted above for growth of jobs in San Francisco. For this reason, during the latter four years of the upcoming forecast period, it is assumed that Transbay peak demand will grow by at least 2.7 percent annually. (This is the equivalent of assuming that BART, with a 37 percent share of peak period Transbay travel, effectively attracts all new peak growth in the corridor).

Costs of commuting by other modes are not expected to diminish relative to BART fares. Although gasoline price changes do not appear to have been closely correlated with past BART ridership changes (see Figure 12 above), it is likely that the long-run gasoline price level will rise relative to BART fares, thus contributing to greater demand for BART. CBD parking charges are probably a more significant cost factor in the decision to ride BART; the updated forecast assumes that parking costs will not diminish.

BART's Capacity Expansion Program is the principal factor supporting growth of peak period ridership which is within the District's control. The expected results of this program with respect to future increases in BART peak period capacity will be reviewed in the next section. Here it should be noted that the highest average peak period growth rate over the past five years was recorded on the one Transbay route where capacity could be increased during the peak hour (Richmond-Daly City). In the Transbay market, ridership is very responsive to capacity increases.

The importance of service quality as a factor in maintaining ridership was emphasized during FY 1985/86. During the latter half of 1985, peak period train service delays resulted from construction work on capacity expansion projects at Daly City station and the KE track in downtown Oakland. This service impact (coupled with high load factors during the prior three years) exaccerbated the drop in patronage following the January 1986 fare increase. During the last three quarters, service quality has returned to the previous level. This should begin to be recognized in near-term patronage expansion. Continued ridership growth will depend heavily on maintenance of service quality. Every effort should be made to minimize the impact on service of the final stage of capacity expansion projects, such as the work at M-87 (in the vicinity of Daly City station) during the latter half of 1988. The updated demand forecast summarized below assumes that current high levels of service quality will be maintained and that construction impacts will be kept to an absolute minimum.

The leveling off of ridership after April 1985, the drop in patronage after the January 1986 fare increase and the long period before significant recovery support the need for a more comprehensive marketing program at BART. In such a program, promotion is but one facet of a total approach where concern for the rider is paramount in all aspects of service planning and delivery. Corporate leaders in many industries are beginning to recognize the need for this commitment, and BART is no exception. The updated forecast assumes that a comprehensive marketing program will be implemented during the planning period.

Five-Year Patronage Forecast

The patronage forecast for the upcoming five-year period takes the actual estimated level of ridership during FY 86/87 as a starting point. The FY 86/87 estimate amounts to 196,000 per average weekday, 1,106,000 per typical week, and 56.8 million during the fiscal year.

Off-peak ridership, including both weekdays and weekends, grew at a rate of 2.5 percent during 1986. Prior to 1986, even higher growth rates were recorded. For the upcoming forecast, it is assumed that demand for weekday off-peak and weekend travel on BART will increase by 2.5 percent annually.

The peak period ridership forecast for FY 87/88 assumes a 1 percent growth rate over the FY 86/87 actual/estimated level. This assumption reflects the fact that peak period load factors and ridership levels have remained relatively low by historical standards since the fare increase, despite service quality which has been at or near the highest level yet recorded. Although ridership has generally been on the increase since June 1986, peak riders departed the system in greater numbers than did off-peak patrons since mid-1985. It is too soon to determine how much of the overall upturn in patronage is due to peak riders.

Peak period ridership projections for the FY 88/89 - FY 91/92 period are based on one of two methods. Peak hour peak direction Transbay projections are based on a load factor/growth rate relationship observed during the 1982-1985 period (and documented in the previous Five-Year Plan). During that time, low load factors resulted in consistently higher than average growth rates and growth all but ceased as load factors approached 1.50. The model is a linear approximation of this relationship, ranging from 10% at a 1.1 load factor to 0 at 1.50. All remaining peak period trips are assumed to grow at the 2.7 percent annual rate discussed above.

The demand forecast thus depends on the timing and distribution of additional peak period trains (which is reviewed in more detail in the next section). A separate patronage estimate is shown for each planned service increment and each fiscal year. The updated patronage forecast is presented in Figure 13 in daily terms and is also summarized on a fiscal year basis.

NEW PEAK SERVICE CAPACITY

The goal of BART's Capacity Expansion Program is to reduce minimum headways, thereby permitting more trains to be placed in service. Projects required to achieve or support each successive headway reduction are identified in Figure 14 together with their respective completion dates. The target dates reflect current plans for capital project implementation. However, these may be altered by funding limitations or changes necessary for smooth project

Figure 13

PATRONAGE FORECAST BY FISCAL YEAR

	FY 1987/88	FY 1988/89	FY 1989/90	FY 1990/91	FY 1991/92
TYPICAL DAY PASSENGER TRIPS					
Peak Periods	97,250	105,363	109,690	115,027	120,762
Weekday Offpeak Period	102,630	104,829	107,468	110,171	112,929
Total Weekday	199,880	210,192	217,158	225,198	233,691
Saturday	83,500	85,603	87,758	89,965	92,217
Sunday	48,710	49,937	51,194	52,482	53,795
ANNUAL PASSENGER TRIPS (000)	57,894	60,773	62,731	64,969	67,327

FIGURE 14

BART CAPACITY EXPANSION PROGRAM

3/31/87

Minimum Headway Capability (Min:Sec)	Projects Required To Achieve or Support This Headway	Anticipated Project Completion Dates	Target Expanded Service Start Dates	Peak Hour Trains Peak Direction Transbay	Peak Period Capacity Trains		On-Line Cars	Spare Cars	Total Cars Required	Available Fleet A/C-Cars @85% B-Cars @90% (Extra)	Operating Fleet Size	
3:45 (except for 3:00 during peak 15 minutes)	Current Service	---	Nov 86	17	45	A B T	90 246 336	16 24 40	106 270 376	113 (+7) 272 (+2) 385 (+9)	134 303 437[d]	A B T
	Delivery of 48 C-Cars	Dec 87	Jan 88	17	45	A C B T	76 41 248 365	16 0 24 40	92 41 272 405	114 (+22) 41 272 427 (+22)	135[e] 48 303 486	A C B T
3:10	Removal of Vent Separation	Oct 87										
	Elect. Capacity Increase: Install 3rd Rail & Yard Feeder	Dec 87										
	Daly City Turnback	Apr 88										
	Delivery of 48 Additional C-cars (96 total)	Jul 88	Sep 88	19	51[f]	A C B T	86 76 234 396[f]	14 6 37 57	100 82 271 453	114 (+14) 82 272 (+1) 468 (+15)	135 96 303 534	A C B T
2:30	Daly City Yard	Jul 88										
	New On-Board ATC (A-Car Retrofit)	Jul 88										
	M-87 Interlocking	Dec 88										
	Delivery of 54 Additional C-Cars (150 total)	Dec 88										
	Elect. Capacity Increase: Procure & Install Sub-station	May 89										
	Wayside Train Control/System Performance Mods	Jul 89										
	ICS	Oct 89	Sep 89	21	50[g]	A C B T	70 116 214 400[g]	8 12 42 62	78 128 256 462	114 (+36) 128 272 (+16) 514 (+52)	135 150 303 588[f]	A C B T
2:15	Brake Rate Algorithm Modifications	June 90	Sep 90	24[h]	53[h]	A C B T	78 122 226 426[h]	14 6 42 62	92 128 268 488	114 (+22) 128 272 (+4) 514 (+26)	135 150 303 588	A C B T

FOOTNOTES TO CAPACITY EXPANSION PROGRAM (Figure 14)

[d] Status as of January 31, 1987; reflects 2 A-cars in use as engineering test vehicles and one A out for accident damage.

[e] Accident damaged A assumed to be repaired.

[f] Reflects addition of 3 trains and 13 cars on-line during peak; also includes 3 extra trains comprised of 18 cars and required for operation of Daly City Turnback (prior to system resignaling) which do not increase actual capacity during regular peak cycle.

[g] Reflects addition of 2 trains and 22 cars on-line during peak (note: assumes requirement for 3 trains in Daly City Turnback is offset through resignaling).

[h] Reflects 3 trains and 26 cars in September 1990 with start of 2:15 headways. In the next and last year of the plan (FY 91/92), one additional train is projected bringing the peak hour Transbay count to 25 and the total trains on the system to 54. Car requirements during FY 91/92 are expected to increase by 26, bringing the total on-line to 452 and the total required including spares to 514 which equals the projected total cars available.

implementation. Each higher service level is characterized by the number of peak-hour peak-direction Transbay trains, the total number of peak-period trains and cars on-line, spare car requirements, and total cars required. Projected availability figures are shown for comparison purposes. As shown in Figure 14, four service increments are planned for implementation during the five-year period as completion of supporting capital projects permits.

Current BART service is nearly at capacity in terms of effective use of available B-Cars. Although additional A-Cars are available, any new trains would require taking B-Cars from already scheduled consists. The C-Car project will add 150 vehicles to the District fleet, the impact of which is reflected by BART's fleet size as shown in Figure 14.

Service Expansion Considerations

BART capacity expansion is essential based on ridership data and BART's Latent Demand Survey which indicates that current potential ridership is several times the number of commuters actually using the system. Growth of new CBD-oriented peak period travel is likely, given current and projected office expansion plans in San Francisco and Oakland. Significant expansion of highway capacity, especially during the next few years in the Transbay and other key corridors, is not planned. Programmed highway reconstruction for both I-80 and I-880 is expected to result in increased traffic congestion and a shift to BART usage as these long-term highway improvements require lane closures.

The BART Capacity Expansion Program is designed to meet this need to transport more commuters, especially in the Transbay corridor. This section outlines and updates the planned allocation of new service increments by route based on the peak demand forecast described above. The Transbay component of existing 45-train service is summarized graphically in Figure 15. This graph indicates the number and sequencing of trains by route for the P.M. peak train cycle and provides the baseline against which to compare subsequent service levels.

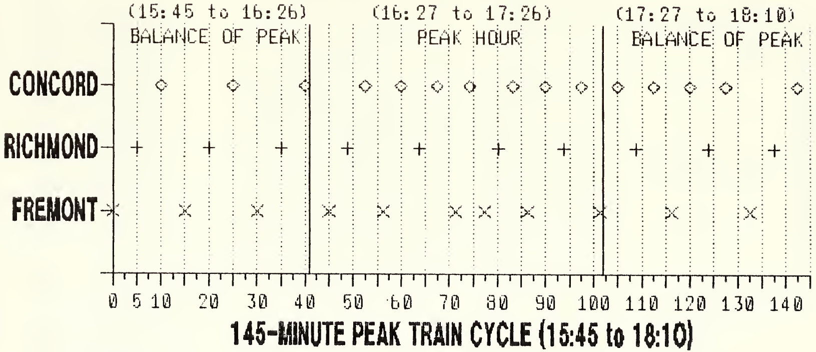
The peak hour demand projections updated in this plan assume that existing trains will be lengthened where possible in response to increased patronage before adding trains. There are two reasons for this. No further trains can be added to peak hour Transbay service until the next headway reduction (to 3 minutes 10 seconds) is possible in mid-1988. Also, trains in the balance (or "shoulder") of the peak generally have lower load factors and capacity to accommodate more cars.

Additional trains are programmed, as headway reductions permit, when the number of cars required to maintain a 1.1 load factor exceeds 10 times the number of trains on a given route. Under this approach, most of the planned additional trains are targeted for the two most heavily travelled routes. This allocation strategy has generally been the basis for previous plans. Current budget constraints support this rationale.

During 1986, total peak ridership by route was as shown in Figure 16. Ridership on the Concord route exceeded Fremont/Daly City patronage by 46%, Richmond/Daly City trips by 111%, and Richmond/Fremont volume by 281%.

FIGURE 15

45-TRAIN SERVICE LEVEL
PM PEAK PERIOD TRANSBAY SEQUENCE
PK HR: 7 CONCORD, 6 FREMONT, 4 RICHMOND



NOTES:

(1) Sequence starting at 3:45 PM from Embarcadero Station.
(2) Total of 45 trains on line -- C/DC=15, F/DC=11, R/DC=9, F/RI=10.
(3) Throughput on R/DC is 10 trains due to shorter route.
(4) Minimum headway is 3 minutes 45 seconds, except for 3-minute headways during peak 15 minutes.

Figure 16

PEAK PERIOD, PEAK DIRECTION
RIDERSHIP BY ROUTE, 1986

Route	Peak Hour	Balance of Peak Cycle	Total
Concord/Daly City	5,991	5,194	11,185
Fremont/Daly City	4,355	3,283	7,638
Richmond/Daly City	2,546	2,750	5,296
Richmond/Fremont	1,507	1,428	2,935
Total	14,399	12,655	27,054

The most crowded train load factor is an index of patron trip scheduling preference or constraint. Over the last several years, the peak has broadened on the Concord route as more riders adjusted their travel schedules in order to take advantage of lower load factors in the balance of the peak cycle. A significant proportion of Fremont/Daly City riders is unwilling or unable to do so. Thus, this route experiences the highest level of crowding on the most heavily loaded train.

Capacity of the bus transit system and the highway network in each corridor should also be considered in allocating future BART peak capacity increases. The Concord route effectively has no parallel bus service, and virtually all highway traffic is constrained to the congested Caldecott Tunnel. The Richmond corridor is facing increased traffic congestion on Interstate 80, and this has reduced the travel time advantage of AC Transit service compared to BART. The corridor stretching south from Oakland to Fremont is served by Interstate 580 and 880, each of which is less congested than Interstate 80. AC Transit service, especially in the Interstate 580 corridor, is attractive and competitive with BART. Delays affecting traffic approaching the San Francisco-Oakland Bay Bridge are also increasing. This condition is beginning to affect the toll free carpool-bus lane through the Toll Plaza.

Planned Service Increments

All of the above factors have been considered in developing the proposed allocation of future BART service increments among the four routes currently operated. Planned additional trains and cars are indicated by route in Figure 17 together with existing service. The proposed plan calls for a phased increase of 9 trains from the 45 now operated to 54 by FY 91/92 in four increments.

- In January 1988, availability of a portion of the C-cars will permit lengthening of some existing trains.
- In September 1988 when headways are reduced to 3 minutes 10 seconds, three more trains will bring the total on-line to 48 (however, until the following increment, 3

Figure 17

TRAINS AND CARS BY ROUTE

FROM TO	Nov 86 Dec 87		Jan 88 Aug 88		Sep 88 Aug 89		Sep 89 Aug 90		Sep 90 Jun 91		Jul 91 Jun 92
HEADWAYS (Min:Sec)											
Minimum Sustainable	3:00		3:00		2:10		1:40		1:30		1:30
Minimum Scheduled	3:45*		3:45*		3:10		2:30		2:15		2:15
Basic Route: Peak /Midday	15:00		15:00		15:00		12:30/15:00		11:15/15:00		11:15/15:00
TRAINS ON LINE, BY ROUTE											
Concord/Daly City											
Peak 60 Minutes	7		7	+1	8	+1	9	+1	10	+1	11
Balance of Peak	8		8	+1	9		9		9		9
Fremont/Daly City											
Peak 60 Minutes	6		6	+1	7		7	+2	9		9
Balance of Peak	5		5		5		5		5		5
Richmond/Daly City											
Peak 60 Minutes	4		4		4	+1	5		5		5
Balance of Peak	5		5		5		5		5		5
Transbay											
Peak 60 Minutes	17		17	+2	19	+2	21	+3	24	+1	25
Balance of Peak	18		18	+1	19		19		19		19
Richmond/Fremont											
Peak 60 Minutes	5		5		5		5		5		5
Balance of Peak	5		5		5		5		5		5
All Routes											
Peak 60 Minutes	22		22	+2	24	+2	26	+3	29	+1	30
Balance of Peak	23		23	+1	24		24		24		24
Total	45		45	+3	48	+2	50	+3	53	+1	54
CARS ON LINE, BY ROUTE											
Concord/Daly City											
Peak 60 Minutes	69	1	70	10	80	10	90	10	100	10	110
Balance of Peak	65	7	72	-2	70	2	72		72	3	75
Fremont/Daly City											
Peak 60 Minutes	54	6	60	9	69	1	70	11	81	9	90
Balance of Peak	36	4	40	-2	38	1	39	1	40	1	41
Richmond/Daly City											
Peak 60 Minutes	34	6	40		40	6	46	3	49	1	50
Balance of Peak	39	3	42	-1	41	1	42	1	43	1	44
Transbay											
Peak 60 Minutes	157	13	170	19	189	17	206	24	230	20	250
Balance of Peak	140	14	154	-5	149	4	153	2	155	5	160
Richmond/Fremont											
Peak 60 Minutes	24	2	26	-1	25	1	26		26	1	27
Balance of Peak	15		15		15		15		15		15
All Routes											
Peak 60 Minutes	181	15	196	18	214	18	232	24	256	21	277
Balance of Peak	155	14	169	-5	164	4	168	2	170	5	175
Total	336	29	365	13	378	22	400	26	426	26	452

more trains will be needed to maintain headways in and out of the Daly City Turnback, bringing the total in service to 51 as shown in Figure 14).

- With the provision of 2-1/2 minute headways in September 1989, an additional two trains would be put in service for a total of 50 (signaling changes implemented at this time are expected to increase operating speed enough to eliminate the 3 train Daly City Turnback requirement).
- When headways are reduced to 2 mintues 15 seconds, current plans call for 3 more trains.

Planned service increments reflect estimated requirements based on current demand projections. Should these requirements change prior to start-up dates, service increments will be modified accordingly.

January 1988: 29 Additional Cars

The first increment during the planning period involves the addition of 29 cars based on the projected availability of 48 C-cars as of December 1987. Opportunities for reducing discretionary train load factors to 1.1 exist on all four routes. Allocation based on this cirterion calls for 8 cars to be added on the Concord/Daly City route, 10 on Fremont/Daly City, 9 on Richmond/Daly City and 2 on Richmond/Fremont, as shown in Figure 17.

September 1988: 3 Extra Trains

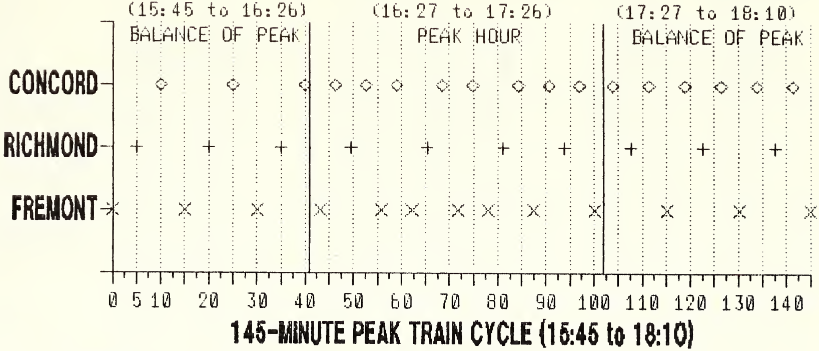
Reduction of minimum scheduled headways to 3 minutes 10 seconds, targeted for September 1988, will permit the addition of two trains to Transbay service in the peak hour. One each is proposed for the Concord and Fremont/Daly City routes. Additionally, maintenance of the 1.1 load factor on discretionary trains during the balance of the peak cycle is expected to require one more Concord train at this time. Total peak capacity would thus be increased by three trains, to 48 on-line. This schedule is shown diagramatically in Figure 18.

Use of the Daly City Turnback will increase run time in and out of the turnback enough to require an additional train on each of the three Transbay routes. These extra trains are included in the total of 51 trains shown for this service level in Figure 14. However, they will serve the peak load point on each route after the peak period and thus do not represent an increase in peak period capacity. Resignaling of the system is expected to reduce run times enough to negate the requirement for these three extra trains by the subsequent service increment.

Concurrent with this service increment, the spares requirement

FIGURE 18

48-TRAIN SERVICE LEVEL
PM PEAK PERIOD TRANSBAY SEQUENCE
PK HR: 8 CONCORD, 7 FREMONT, 4 RICHMOND



NOTES:
(1) Sequence starting at 3:45 PM from Embarcadero Station.
(2) Total of 48 trains on line -- C/DC=17, F/DC=12, R/DC=9, F/RI=10.
(3) Throughput on R/DC is 10 trains due to shorter route.
(4) Minimum headway is 3 minutes 10 seconds.

will be increased by 17 cars in recognition of the longer average train length in peak service and thus required for spares.

September 1989: 2 Extra Trains

When capacity expansion projects required to support 2 minute 30 second headways are complete in September 1989, current plans are to add one additional peak hour train on each of the Concord and Richmond/Daly City routes. This schedule of 50 peak period trains is shown schematically in Figure 19.

Car requirements are expected to grow by 22 vehicles which are allocated to all four routes, as indicated in Figure 17. An increase in the spares requirement of 5 vehicles is also planned to support this service level. This increase is based on replacement of consists with the longer average train length expected to be in service at this time.

September 1990: 3 Extra Trains

The final phase of capacity expansion is programmed to support 2 minute and 15 second headways. This is currently expected to start in September 1990. The patronage forecast and load factor criterion call for three additional peak hour Transbay trains. One would be added to the Concord route and two to the Fremont/Daly City route. This brings the total trains on-line to 53. With this service increase, 26 more cars would be added to peak period trains.

Anticipated patronage growth in the final year of the current planning period is anticipated to require an additional train on the Concord route and an additional 26 cars on all four routes. Note in Figure 14 that, with 54 trains in peak period service, all 452 vehicles available for on-line service are expected to be utilized.

Future Vehicle Requirements

According to current plans, all available vehicles including the C-cars will be in service as of FY 1991/92. Expansion of service capacity beyond this level will require the acquisition of additional rolling stock.

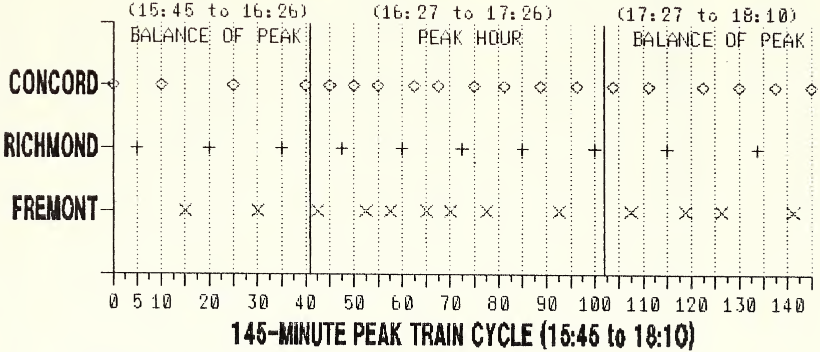
Procurement of additional vehicles should be considered with sufficient lead time to bring on extra capacity when needed. The key factors influencing this decision will be the availability of capital funds and the growth of peak period demand.

SERVICE QUALITY

Although provision of adequate capacity has become the District's top priority, the District's policy is to insist on high quality service. Thus, the key consideration in adding new service is to maintain or enhance current reliability standards, even if that requires additional time for resolving problems and testing to assure a smooth transition to higher service levels.

FIGURE 19

50-TRAIN SERVICE LEVEL
PM PEAK PERIOD TRANSBAY SEQUENCE
PK HR: 9 CONCORD, 7 FREMONT, 5 RICHMOND



NOTES:
(1) Sequence starting at 3:45 PM from Embarcadero Station.
(2) Total of 50 trains on line -- C/DC=18, F/DC=13, R/DC=9, F/RI=10.
(3) Throughput on R/DC is 10 trains due to shorter route.
(4) Minimum headway is 2 minutes 30 seconds.

Indeed, improved service quality in the early 1980's was largely responsible for attracting additional BART patronage. Continued growth of BART ridership will depend heavily on the extent to which service quality can be maintained and improved. Because scheduling more trains on the system will alter the current operating environment, it will be essential to maintain system reliability while implementing capacity improvements. Work completed as a part of the System Performance Study has contributed to the identification of achievable capacity objectives in the context of current high reliability standards.

Many improvements in system performance were the direct result of the Reliability Improvement Program. This includes: increased on-time performance, improved car and train throughput, and reduced incident rates for passenger offloads, AFC equipment, and train removals.

Earlier service quality improvements supported BART's decision in 1978 to publish a train schedule for both evening and weekend service. Daytime weekday train performance improvements, as reflected by a 95% on-time record, justified publication of a similar schedule for weekday operations in April 1983. Maintenance of service standards will be increasingly challenging as BART commences its service expansion program.

COST EFFECTIVENESS AND PRODUCTIVITY

Cost effectiveness and productivity are integral to overall financial performance and the economies of providing expanded levels of service. Favorable performance in these, as well as other areas, is directly dependent upon management's ability to formulate and implement effective programs to control costs. BART's costs per passenger, and per vehicle mile have declined over the past seven and one-half years, as shown by the constant dollar comparisons in Figures 20 and 21. At the same time, BART patronage and vehicle miles per equivalent employee have risen. This is solid evidence of BART productivity. Additional gains in the future will be harder to attain. Management efforts will need to focus on strategies to hold the line on expense and to evaluate new ways of allocating resources.

Labor costs comprise the largest component of total operating expense and the one expense factor most directly under District control. To the extent that output can be increased without proportional increases in staffing, future labor cost increases can be held within the limits of available resources. Additionally, since electrical energy is the largest non-labor expense item, District efforts will need to focus on developing operating strategies which can minimize power consumption (i.e., car miles), consistent with load factor objectives. Similar consideration will need to be given to purchased transportation expense, the second largest non-labor expense item. The programmed streamlining of BART Express Bus service should be continued as planned. This component of expense has increased in recent years, and its farebox ratio is well below the standard set for overall District operations.

On the funding side, increasing transit operator demands for regionally allocated discretionary funds are expected to limit BART's share of these resources. Additionally, capital funding limitations will require BART to continue to generate a portion of its capital funding requirements through operating sources in order to provide for essential system replacements and

Figure 20

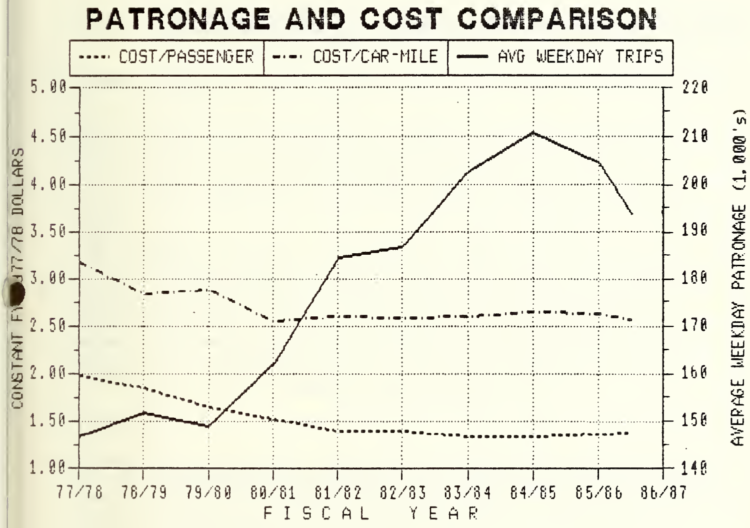
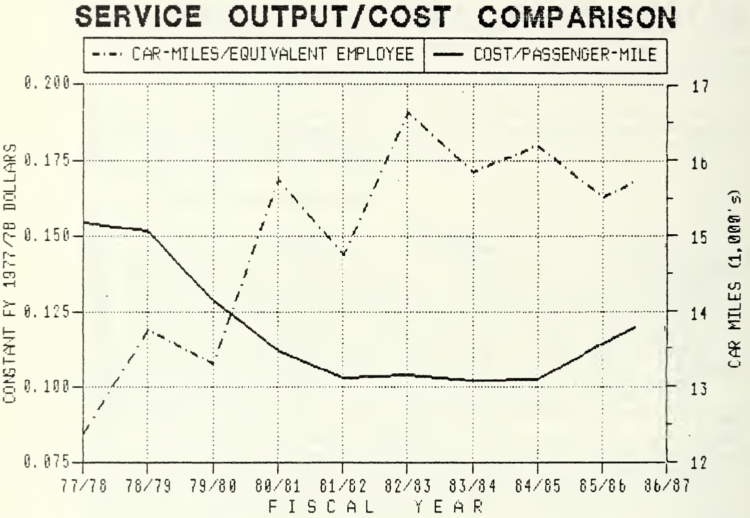

PATRONAGE AND COST COMPARISON
COST/PASSENGER
COST/CAR-MILE
AVG WEEKDAY TRIPS
CONSTANT F 77/78 DOLLARS
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
AVERAGE WEEKDAY PATRONAGE (1,000's)
220
210
200
190
180
170
160
150
140
77/78
78/79
79/80
80/81
81/82
82/83
83/84
84/85
85/86
86/87
FISCAL YEAR

Figure 21


SERVICE OUTPUT/COST COMPARISON
CAR-MILES/EQUIVALENT EMPLOYEE
COST/PASSENGER-MILE
CONSTANT FY 1977/78 DOLLARS
0.200
0.175
0.150
0.125
0.100
0.075
CAR MILES (1,000's)
17
16
15
14
13
12
77/78
78/79
79/80
80/81
81/82
82/83
83/84
84/85
85/86
86/87
FISCAL YEAR

improvements. These limitations are expected to become more severe as competition for decreasing federal capital funds becomes more intense.

Continued pressure on the District's financial resources will further emphasize the need for efficient and effective operating strategies which incorporate innovative productivity measures. Further, key capital improvements which can enhance current operational efficiencies will need to be completed in order to realize long-term economies and increased productivity. Both the Daly City Turnback and Yard and the new C-cars will produce significant operational benefits and resulting cost savings as has the KE Track which has been in operation for just over one year. Every potential operating efficiency must be examined in order to take the necessary steps to reduce cost pressures and minimize the impact of any required fare increase.

PROGRAM DELIVERY

Realizing BART's inherent economies of scale and latent capacity potential by the end of this planning period is a realistic but challenging objective. Based on the projections noted above, it seems reasonable to expect significant growth in ridership if capacity increases can be delivered in a timely manner. These capacity increases depend heavily on implementation of the District's Capital Improvement Program which is discussed in detail in Volume II.

The provision of increased capacity depends upon the joint implementation of critically needed projects. Lacking one or more components, the system will not be capable of performing at the required higher level of capacity. Estimated completion dates for these projects are highlighted in Figure 14 above. The service expansion scenario also described above depends completely on realization of these capacity enhancements as scheduled. Timely funding and effective project management are therefore essential to assure the scheduled delivery of these important capital improvements.

EXTENSIONS

Extensions to the 71-mile basic system were thoroughly reviewed in the "New Starts and Extensions" hearings held by the Metropolitan Transportation Commission (MTC) in FY 1983/84 for the purpose of prioritizing these and other regional projects for future implementation. The resulting MTC New Starts and Extensions Progam supports the four BART extensions which are in Phase I (Within Current Three-County District Priority) of the BART Extension Policy.

Acquisition of extension station sites is in progress. Interim usage of these future rail station sites is being coordinated with the District's planned improvements to the Express Bus program to provide freeway-oriented, park/ride lots for Express Bus service.

MAINTENANCE REQUIREMENTS

In late 1976, BART adopted a new maintenance and engineering philosophy which led to the development of a new Maintenance Plan. For the three maintenance divisions: Engineering establishes criteria, Maintenance performs the work using Engineering provided documents, with Inspection ensuring that Maintenance is performing to Engineering criteria. This proven philosophy is expected to remain in effect during the current five-year planning period. A description of District maintenance departments, personnel, facilities, and a summary of BART's maintenance program are included in Appendix A in Volume III.

EXPRESS BUS EFFECTIVENESS AND PRODUCTIVITY

Concern about the cost, relatively low farebox recovery ratio, and local service nature of BART Express Bus Service led to a major reevaluation of this program. Efforts to upgade the program began with the drafting of a revised scope of services which formed the basis for an amended contract signed during FY 1984/85. On-time performance standards and a farebox revenue objective were established. The reevaluation of service has sought to identify opportunities for reduction of scheduled travel times by shifting to more freeway-oriented operations.

ENERGY CONTINGENCY REQUIREMENTS

Although gasoline supplies are currently more than adequate, energy contingency concerns should not be ignored. In the event of a significant gasoline shortage which would divert large numbers of automobile commuters to the system, BART will not be able to expand peak period service until the new revenue vehicles on order are delivered. All available BART rail vehicles are essentially used to provide current service. Significant capacity expansion will not occur until September 1988 with the reduction in Transbay headways to 3 minutes 10 seconds.

In view of this inability to expand capacity significantly until the latter part of 1988, BART's response to a gasoline shortage will of necessity be comprised of the following types of activities:

- Extension of peak period service beyond the current transition to offpeak service to accommodate commuters who can shift their normal working hours;

- Provision of information about train loading patterns especially with reference to space available in non-peak directions for reverse commuting;

- Consideration of higher peak period fares to shift non-essential trips to offpeak periods.

Each of these responses to a gasoline shortage condition could be implemented within a fairly short time interval.

CAPITAL INVESTMENT PLANNING

For the past several years, BART has recognized the need to implement capacity expansion projects which will augment the capability of the present system to transport commuters into the Central Business Districts of San Francisco and Oakland. This need to develop and finance a number of major capacity expansion projects has entailed a comprehensive capital investment planning effort. This work involves a determination of needs and/or problems to be resolved, identification of alternatives, and evaluation of potential solutions. After selection of appropriate projects, funding strategies are developed to maximize state and local financial resources. Capital investment planning, following these guidelines, is an integral part of BART's Five Year Planning process.

PRIVATIZATION

Although BART is a public agency, a considerable amount of its operating budget is spent on contracted provision of goods and services, mainly through private firms. There is growing recognition that private providers may have an important role in support of transit operations, especially as public financial support is diminished. Pressure on future operating budgets will require that alternative sources of goods and services be considered. BART has already identified possible opportunities for private providers of selected feeder and/or Express Bus service and has established a notification process to ensure that such opportunities are communicated to private providers. In addition, BART seeks to participate actively with the private sector in a joint development program as a means of financing access improvements.

In response to more definitive federal guidelines on privatization, BART has prepared detailed documentation of District policy and procedures in support of maximizing private sector participation. This information will be transmitted to the Urban Mass Transportation Administration (UMTA) in support of current grant applications, and is contained in Appendix B in Volume III.

DISADVANTAGED AND WOMEN BUSINESS ENTERPRISE

All sectors of the economy merit an equal opportunity to participate in publicly financed endeavors. BART has specifically recognized this concern in setting its annually adopted performance objectives. BART's performance through FY 1985/86 has approximated or exceeded the District's goals, and District management recognizes the need to maintain a strong resolve to provide an affirmative action contract environment.

FIVE YEAR PLANNING PROCESS

BART was in the vanguard of transit systems which developed management-by-objectives processes, systematic performance monitoring, and five-year planning efforts. This philosophy continues to guide District management and policy makers. The District's Quarterly Performance Report on System Objectives is integral to the five-year planning process and serves as a detailed checklist by which management performance is routinely monitored and publicly communicated. This process is considered to be essential to sound management and effective delivery of responsive BART service.

BART's Five Year Plan includes an analysis of key factors which affect the management and operation of the system. As such, service planning is a major focus as is the development of five-year financial forecasts. Periodic fare structure adjustments are necessary to keep pace with inflation and provide new services as appropriate. In this regard, the planning process is essential as a means to determine the magnitude of equitable fare increases necessary for the attainment of incremental revenue targets.

BART's Five Year Plan also addresses improved efficiency of operation through the Productivity Improvement Program, and monitors Elderly and Handicapped services through the BART Access Program.

CHAPTER II

PERFORMANCE EVALUATION
&
SERVICE IMPROVEMENTS

BART demand is largely influenced by the inherent characteristics of rail service relative to alternative modes, primarily automobile. These characteristics include service quantity, quality, and expense which relate to:

> Is there adequate capacity at frequent intervals to accommodate demand?
>
> Is the service reliable to the extent that travel times are predictable and consistent?
>
> How much does the service cost to provide and use?

This chapter will focus on an evaluation of District performance in terms of the quantity and quality of **BART SERVICE DELIVERY** as the primary factors which are reflected by **PATRON RESPONSE** (i.e., ridership) and **FINANCIAL PERFORMANCE.**

The discussion begins with the key attributes of service delivery from the perspective of shop production and meeting car availability objectives to delivering passengers to their destination stations ontime with consideration for safe and free passenger flows entering and exiting stations. Figure 22 on the following page summarizes these service delivery attributes and the key indicators used to measure performance. These key indicators correspond to selected District objectives which have been identified as those high-level measures which best characterize overall train service quality, fare equipment dependability, patron response, and financial performance. Performance with respect to supporting District objectives is also discussed as these other measures relate to the key objectives. A complete performance record for all of BART's FY 1986/87 objectives is presented in Figure 23. Additionally, performance achievements and deficiencies are presented with corrective actions identified as the District's strategy for improving productivity, efficiency, and overall performance. The emphasis of this evaluation is on system operations and includes a discussion of necessary programs and capital projects which have been identified as a prerequisite to achieving higher performance levels. For additional details regarding individual capital projects and related expense, refer to Volume II: Capital Improvement Program.

CAR AVAILABILITY

As shown in Figure 22, the delivery of desired service begins with meeting car availability objectives so that scheduled capacity can be provided in terms of the number of cars and trains online. Figure 24 on page 44 identifies quarterly car availability versus objectives since July 1982. As seen, car availability has been favorable throughout the 4-1/2 year period shown with the exception of mid 1985 when available B-cars dipped just below the service requirement objective. This occurred during the midst of the District's vehicle fire-hardening program which required that 5 A-cars and 11 B-cars be rotated out of service at any one time. This program was completed in August 1986 and has resulted in higher car availability as shown by the chart. This supported an expansion of peak period service from 43 to 45 online trains beginning November 3, 1986, two months ahead of the January 1987 target for this service expansion. Figure 25 summarizes the car and train requirements

Figure 22

DESIRED PERFORMANCE ATTRIBUTES AND RELATED KEY DISTRICT INDICATORS

Meet Car Production Schedule to Support Train Schedule
Four AM Car Availability

Provide Scheduled Train Runs
Scheduled Train Dispatches Completed

Run Trains Without Delay
Peak Period Train Delay Events

Provide Scheduled Transbay Capacity
Peak Period Transbay Throughput

Deliver Patrons On Time
Patron On-Time Performance

Maintain Unimpeded Patron Flows Through Stations
AFC Incident Rate

Achieve Ridership Forecasts
Average Weekday Patronage

Achieve Revenue Forecasts and Keep Expenses Within Budget
Rail Farebox Ratio
System Operating Ratio
Rail Cost Per Passenger Mile

Figure 23

STATUS FOR FY 1986/87 DISTRICT OBJECTIVES

OBJECTIVES[a]	JUL-DEC 1986 YTD			FY 1986/87 YEAR-END OBJECTIVE
	ACTUAL	OBJECTIVE[b]	PERCENT[c] OBJ LEVEL	
A1. Load Factors: Peak Period[d] -- Concord/Daly City	1.09	Balance	(e)	Balance
Fremont/Daly City	1.11	Within	(e)	Within
Richmond/Daly City	1.08	System	(e)	System
Fremont/Richmond	0.98	Limits	(e)	Limits
Offpeak Period[f]	0.75	1.05	(g)	1.05
A2. Peak Period/Peak Direction Transbay Throughput (%): Trains	98.3	98.0	100.3	98.0
Cars	97.3	97.5	99.8	97.5
A3. Weekday 4 AM Car Count: A-Cars	112	102	109.8	102
B-Cars	274	261	105.0	261
A4. Add Two Peak Period Trains by January 1987 (Yes/No)	Yes	Yes	100.0	Yes
B1. Scheduled Weekday Train Dispatches Completed (%)	99.2	99.0	100.2	99.0
B2. Weekday Train On-Time Performance (%): Daily	95.6	95.0	100.6	95.0
Peak Period	94.3	93.0	101.4	93.0
B3. Peak 7-Minute Delays (Per 100 Train Runs):[h] Delay Events	1.94	2.00	103.1	2.00
Trains Delayed	5.74	6.00	104.5	6.00
B4. Patron Trip On-Time Performance (%)	94.2	94.0	100.2	94.0
B5. Offloads (Annual Incidents/1000 Car-Hrs):[i] Vehicle Equipment	0.89	1.10	123.6	1.10
Wayside Equipment	0.06	0.10	166.7	0.10
Operations & Other	0.54	0.80	148.1	0.80
Total	1.48	2.00	135.1	2.00
B6. AFC Performance: Incidents/1000 Trips	0.32	0.30	93.8	0.30
6 AM Entry/Exit Gate Availability (%)	96.2	95.0	101.3	95.0
6 AM Ticket Vendor Availability (%)	91.2	90.0	101.3	90.0
B7. Weekday 6 AM Elevator/Escalator Availability (%): Elevators	99.4	95.0	104.6	95.0
Escalators	98.6	93.0	106.0	93.0
B8. Express Bus On-Time Performance (%)	98.3	95.0	103.5	95.0
C1. Patron Accidents (Annual Rate--Incidents/Million Trips)[i]	15.8	17.7	112.0	17.7
C2. Employee Lost-Time Rate Due to Industrial Injuries(%)	0.94	0.50	53.2	0.50
C3. Emergency Plan Exercises (Number Conducted/Month)	2.5	1.0	250.0	1.0
D1. Patronage (Number of Trips): Average Weekday	193,825	206,476	93.9	208,000
4-Hour Weekday Peak	94,226	103,302	91.2	104,200
Weekday Offpeak	99,599	103,174	96.5	103,800
Saturday	83,676	91,738	91.2	93,200
Sunday	47,483	49,162	96.6	49,600
D2. Offpeak Patronage (% Above Forecast): Weekday	-3.5	3.0	-116.7	3.0
Saturday	-8.8	3.0	-293.3	3.0
Sunday	-3.4	3.0	-113.3	3.0
D3. System Cleanliness (%):[j] Station Facilities	94.5	90.0	105.0	90.0
Trains	99.0	90.0	110.0	90.0
D4. Patron Complaints About Employees (Per Million Trips):[k]	13.62	8.75	64.2	8.75
D5. On-Board Service Announcements (% of Required):	(l)	95.0	---	95.0
D6. Install 12th Street Prototype Information Panels (Yes/No)	No	Future	---	Yes
D7. Initiate RTA Information Panels Project (Yes/No)	Yes	Yes	100.0	Yes
D8. Increase Offsite Ticket Sales Outlets to 125	102	Future	---	Yes

*All letter footnotes appear on page 43.

Figure 23

STATUS FOR FY 1986/87 DISTRICT OBJECTIVES

OBJECTIVES[a]	JUL-DEC 1986 YTD			FY 1986/87 YEAR-END OBJECTIVE
	ACTUAL	OBJECTIVE[b]	PERCENT[c] OBJ LEVEL	
E1. Farebox Ratios (%): Rail	52.8	51.2	103.1	52.3
Express Bus	10.6	13.6	77.9	13.6
Total Operation	48.3	47.3	102.1	52.8
E2. Rail Cost Per Passenger-Mile (¢)	20.8	20.9	100.5	20.5
E3. Vehicle-Miles/Equivalent District Employee	15,391	14,686	104.8	14,686
E4. System Utilization (%--Passenger-Miles/Seat-Mile)	32.4	35.7	90.8	35.7
E5. Paid Sick Leave (%--Sick Hours Paid/Straight-Time Hours Paid)	3.65	3.50	95.9	3.50
E6. Report Availability (Production Days):[m] Monthly Patronage	10.3	10.0	97.1	10.0
Budget Performance	13.7	15.0	109.5	15.0
Affirmative Action	(n)	15.0	0.0	15.0
Financial Statements	35.5	25.0	71.4	25.0
Quarterly Performance	33.5	35.0	104.5	35.0
Operations Performance	47.0	45.0	95.7	45.0
Annual Report	(n)	75.0	0.0	75.0
F1. Affirmative Action (Yes/No): Evaluate Performance vs 1983 Plan	Yes	Yes	100.0	Yes
Update 1983-1986 Plan by Dec 86	Yes	Yes	100.0	Yes
F2. Achieve Workforce Representation Objectives	(p)	(p)	(p)	Yes
F3. MBE Participation (%):[q] Federally Assisted -- WBE	1.2	3.0	40.0	3.0
DBE	23.9	18.0	132.8	18.0
Total Contracts -- MBE	19.8	21.0	94.3	21.0
F4. Equity Participation for Joint Development Projects (%)	(r)	15.0	---	15.0
G1. New Parking:[s] Existing Rail Stations (2,455 Stalls)	1,008	Future	---	2,455
Express Bus Lots (500 Stalls)	213	Future	---	500
Total (2,955 Stalls)	1,221	Future	---	2,955
G2. Seek Land for Bond List Surface Parking Projects (Yes/No)	Yes	Yes	100.0	Yes
G3. Continue to Implement BART/AC Schedule Coordination (Yes/No)	Yes	Yes	100.0	Yes
G4. First Stage West Corridor Express Bus Streamlining (Yes/No)	No	Future	---	Yes
G5. Implement Express Bus/Rail Ticket (Yes/No)	No	Future	---	Yes
G6. Implement Joint BART/AC Ticket (Yes/No)	No	Future	---	Yes
G7. Initiate Phase II Elevator Improvements Installation (Yes/No)	No	Future	---	Yes
G8. Platform Edge Project (Yes/No): Complete Evaluation	Yes	Yes	100.0	Yes
Seek Funds (if appropriate)	Yes	Yes	100.0	Yes
H1. Complete Station Area Plans (Yes/No): Fremont	Yes	Yes	100.0	Yes
Concord	Yes	Yes	100.0	Yes
H2. Initiate Station Area Plans for Two Stations (Yes/No)	Yes	Yes	100.0	Yes
H3. Continue Anchor Tenant Marketing Effort (Yes/No)	Yes	Yes	100.0	Yes
H4. Negotiate a Minimum of One Acceptable Ground Lease (Yes/No)	No	Future	---	Yes
H5. Negotiate 5th & Market Special Entrance Agreement (Yes/No)	No	Future	---	Yes
H6. Seek Additional Special Station Entrances (Yes/No)	No	Future	---	Yes
I1. Assist in Completing Fremont-South Bay PDAA/DEIS (Yes/No)	No	Future	---	Yes
I2. Pursue Acquisition of All Extension Program Sites (Yes/No)	Yes	Yes	100.0	Yes
I3. Complete Pittsburg-Antioch PDAA/DEIS (Yes/No)	No	Future	---	Yes

[a]All footnotes appear on page 43.

Figure 23

NOTES

a. Letter and number designations refer to the full objective set. Letter references denote corresponding program area.

b. Year-to-date objective levels may not be equal to the annual objectives which represent an average for the entire year. Non-operating program objective levels shown as "Future" indicate that achievement is slated to occur at a later date during FY 1986/87.

c. This measure of objective achievement is the ratio of actual performance to the objective level, where a maximum value is desired. The reciprocal of this calculation is taken where a minimum value is the desired objective. Thus, 100.0 signifies perfect complaince with of an objective; higher than 100.0 indicates performance above objective levels; and lower than 100.0, performance below standard. Compliance indices for non-operating program objectives shown as "---" indicates achievement is slated for a later date this fiscal year.

d. Peak period load factor objective is to balance load factors wherever possible across the four routes at the maximum load point. Data presented here are for "discretionary trains," or those consists which can be lengthened or shortened within the 3- to 10-car limitation.

e. This objective was judged to be achieved since the scheduled route capacity for discretionary trains came within 1% of the optimum car allocation.

f. Offpeak load factors are for weekday trains only and represent the average of the highest loading for each midday and night train.

g. During the October-December 1986 quarter, this objective was achieved for 51 of 53 offpeak trains which operate on weekdays (i.e., the maximum average load factor did not exceed 1.05 for all but 2 weekday offpeak trains).

h. "Delay events" are the primary causes of one or more train delays. "Trains delayed" are the total number of trains impacted by the primary delay events. Rates are expressed as per 100 train runs (excluding cancelled dispatches).

i. Annual rates are based on 12 months' data ending with the final month of each quarter. Offload data for the last seven quarters reflect a change in accounting for offloads at South Hayward effective December 1984.

j. Indicates percentage of all station facilities or trains (as measured by individual evaluations for vehicles) having met established cleanliness standards.

k. Complaint data are categorized for three groups of employees: train operators, station agents, and all "other" employees (includes complaints about employees which result from face-to-face contact or telephone contact).

l. Data are for the Annual Passenger Services Sampling Survey (conducted each May) which includes sampling of on-board service announcements for arrival stations, transfer points, delays of 1-5 minutes, and delays in excess of 5 minutes. No data are available for the current quarter.

m. Refers to the average time (in workdays) for production as measured by the number of days between the end of a report period and when the report actually is made available.

n. No report issued during this period.

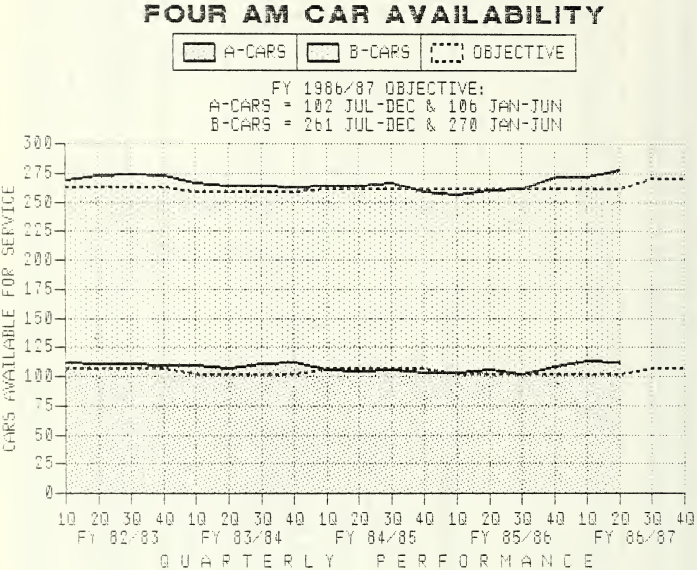
p. For details concerning the achievement of BART's workforce representation objectives, refer to the District's 1983-86 Affirmative Action Assessment.

q. Percentages are based on committed contract dollar amounts for all contracts other than that with SOFERVAL (for procurement of 150 new C-Cars). This latter $183.8 million contract (estimated to be $279.0 with escalation and sales tax) has a separate 14% MBE commitment objective on the U.S. portion of the contract, which is estimated to be 65% of the total contract.

r. Contract commitments have not been formalized to date relative to MBE participation for joint development projects.

s. This objective is based on the implementation of 500 new BART-owned parking spaces at North Concord/Martinez Express Bus facility and 2,455 additional new spaces at existing rail stations as follows: Fremont (1,200 spaces), Lafayette (220 spaces), Orinda (150 spaces), North Berkeley (80 spaces), Hayward (330 spaces), San Leandro (250 spaces), and Fruitvale (225 spaces).

Figure 24



FY 1986/87 OBJECTIVE:
A-CARS = 102 JUL-DEC & 106 JAN-JUN
B-CARS = 261 JUL-DEC & 270 JAN-JUN

CURRENT SERVICE
(As of December 1986)

	COMMUTE WEEKDAY				SATURDAY[a]		SUNDAY[a]	
	AM PEAK	MIDDAY[a]	PM PEAK	NIGHT[a]	DAY	NIGHT	DAY	NIGHT
NUMBER OF TRAINS								
Concord/Daly City	15	10	15	7	8	7	7	7
Fremont/Daly City	11	10	11	b	8	b	b	b
RichmondDaly City	9	9	9	b	7	b	b	b
Fremont/Richmond	10	10	10	7	8	7	7	7
Total On-Line	45	39	45	14	31	14	14	14
Spares	8	7	8	7	c	c	c	c
Total Required	51	46	51	21	c	c	c	c
A-CARS								
Concord/Daly City	30	20	30	14	16	14	14	14
Fremont/Daly City	22	20	22	b	16	b	b	b
Richmond/Daly City	18	18	18	b	14	b	b	b
Fremont/Richmond	20	20	20	14	16	14	14	14
Total On-Line	90	78	90	28	62	28	28	28
Spares	16	14	16	14	c	c	c	c
Total Required	106	92	106	42	c	c	c	c
Maintenance (15% of Fleet)	21	21	21	21	21	21	21	21
B-CARS								
Concord/Daly City	107	24	108	35	15	14	37	7
Fremont/Daly City	71	16	69	b	16	b	b	b
Richmond/Daly City	43	15	47	b	14	b	b	b
Fremont/Richmond	20	10	20	7	8	7	12	7
Total On-Line	241	65	244	42	53	21	49	14
Spares	24	8	24	12	c	c	c	c
Total Required	265	73	268	54	c	c	c	c
Maintenance (10% of Fleet)	31	31	31	31	31	31	31	31

---

a. Base service requirement without consideration of major special events which may require additional capacity

b. No service on these routes during these times.

c. Spare requirements are a yard option for weekend service. A minimum of one train per yard is kept as a ready spare.

for current weekday and weekend service, including ready spare and maintenance requirements.

Above objective car availability is evidence of the effectiveness of BART's preventative maintenance program which is based on availability rates of 85% for automatic train control (ATC) equipped A-cars and 90% for mid-train B-cars. Based on a current operating fleet of 134 A's and 303 B's, objective availability is 114 A-cars and 272 B-cars. The number of trains on line determines the A-car requirement. At 2 A's per train, the net result is that BART has 8 A-cars in excess of its 45-train service and maintenance requirements. (The District owns 3 additional A-cars, 2 of which have been converted to engineering test vehicles and a third with extensive damage that has been removed from the operating fleet.)

Thus, it is currently possible to expand service by adding 4 new trains for a total of 49 online. Three factors argue against this service expansion in advance of the completion of the District's Capacity Expansion Program. First, existing headway constraints dictate that any additional new trains be inserted into the schedule outside the peak hour (i.e., extending higher frequency service further into the "shoulder" or balance of the peak period). A significant shift of ridership out of the peak would need to take place or additional demand would need to occur to warrant this expansion. Current train load factors during the balance of the peak period indicate that expanded service during this period is not justified at this time. Secondly, BART currently has only 4 B-cars in excess of its service and maintenance requirements. These cars could effectively be used to lengthen already scheduled trains which are less than the 10-car maximum as ridership warrants. The third factor which must be considered is the added labor expense associated with the train operators required for the new trains.

Given the current vehicle fleet, favorable car availability will assist the District in delivering maximum service and capacity. Further, the District will continue to closely monitor train loadings to meet load factor objectives and keep within budgeted car hours. The delivery of 150 new C-cars by December 1988 translates into 127 additional vehicles available for service (at an 85% availability standard).

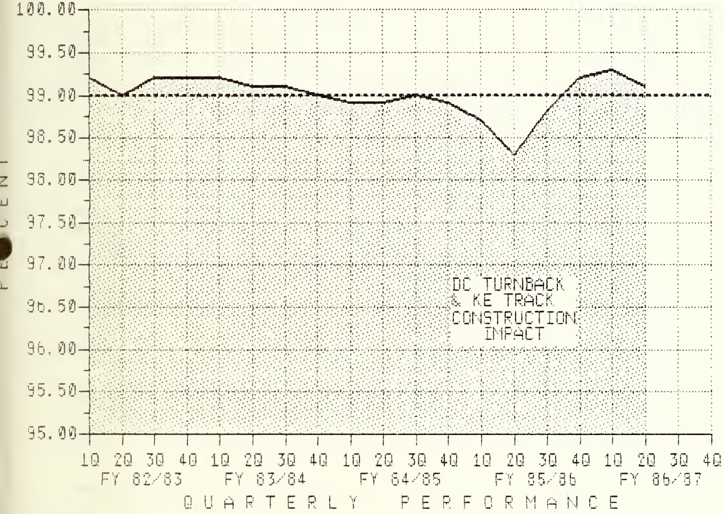
SCHEDULED TRAIN DISPATCHES COMPLETED

The graph in Figure 26 summarizes performance with respect to scheduled train dispatches completed for the past 4-1/2 years. With the exception of the 3 quarters in FY 1985/86 (when Daly City Turnback and KE Track construction directly impacted service with respect to all key train performance indicators), performance has been favorable relative to this stringent 99% objective. The achievement of this service and capacity objective has greatly assisted BART in balancing load factors and providing scheduled Transbay through, as will be discussed. in following sections.

Figure 26

SCHEDULED TRAIN DISPATCHES COMPLETED

FY 1986/87 OBJECTIVE: 99.0%



BART currently schedules 518 train dispatches on a typical weekday (i.e., a run from one end of a route to the other end). This will increase as service is expanded and more online trains are added. With increased service, it is essential that the District's efforts to achieve its offload objective be met since this impacts the level of incomplete train runs and service disruptions which are discussed in the next section on delays.

SERVICE DELAYS

Favorable car availability and scheduled train dispatches completed alone cannot assure the provision of high quality service. Consideration must also be given to service delays and their causes. The emergence of this service delivery factor as an important reliability measure led to implementation of the District's Delay Monitoring Program. This effort, which began in February 1981, tracks all delay events causing peak period trains to be detained more than seven minutes. Figure 27 presents BART performance with respect to peak period delay events. As shown, the delay event rate hovered between 2.25 and 2.50 per hundred train runs during the 3-year period of FY 1982/83 to FY 1984/85. The impact of Daly City Turnback and KE Track construction is clearly apparent in FY 1985/86 with the rate rising to just over 3.25 events per 100 train runs in the second quarter that year. Completion of the KE Track in January 1986 resulted in a downturn for delays in the third quarter with the delay event rate falling to almost the 2.00 objective by the fourth quarter. (Daly City Turnback construction required the removal of one of three train berthing platforms on a rotating basis at Daly City Station. KE Track construction required manual train operations between MacArthur and 19th Street Stations. These events are largely responsible for the unfavorable upswing for the peak period train delay rate during this period.)

Most recent FY 1986/87 year-to-date data indicate the most favorable rates for peak period delay events and delayed trains since the inception of the Delay Monitoring Program. Continuing review of this effort assists in the identification of causes of delays. This information is incorporated into the District's strategy for reducing the probability of delay incidents from occurring; and formulating operational strategies which can minimize the impact of delays. The results of this effort are also apparent with respect to improved performance relative to the District's offload objectives. Favorable performance in this area of operations has resulted in the decision to make the components of the offload objective more stringent.

This is a major step in understanding, at a level of detail much greater than prior to the 1981 inception of the Delay Monitoring Program, how the system can be made more tolerant of certain kinds of component failures. This program has yielded a substantial amount of data which is summarized in Figure 28. An example of how the District has utilized the results of this program to improve performance is the removal of vehicle derail bars (PUC authorization granted in July 1986) which had an immediate favorable impact as reflected by reduced rates for train delays, offloads, and gains for dispatches completed and ontime measures. Another example is the new on-board

Figure 27

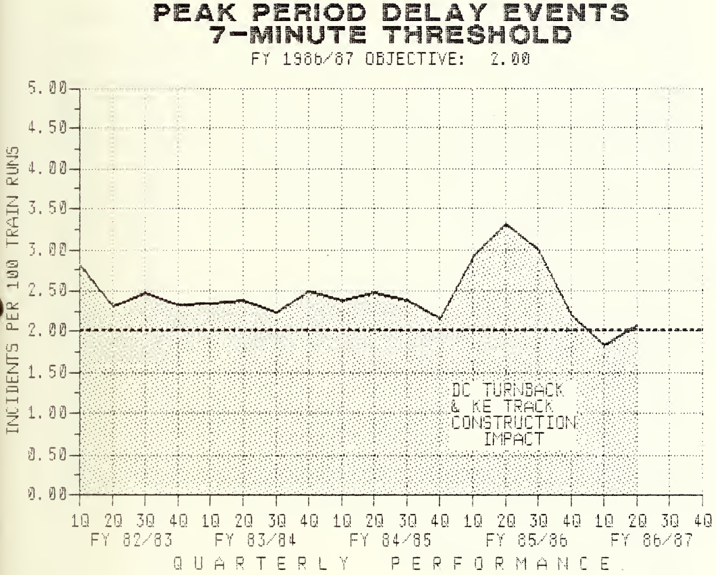

PEAK PERIOD DELAY EVENTS
7-MINUTE THRESHOLD
FY 1986/87 OBJECTIVE: 2.00
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
INCIDENTS PER 100 TRAIN RUNS
DC TURNBACK
& KE TRACK
CONSTRUCTION
IMPACT
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

Figure 28

CAUSES OF PEAK PERIOD TRAIN DELAYS

(7-minute delay threshold data are for period Dec 83 - Nov 86)

	Percent of Total Delay Incidents
VEHICLE EQUIPMENT	
Automatic Train Operations	18.2
Propulsion	14.3
Doors	14.0
Friction Brakes	5.9
Auxillary Electric System	4.2
*Trucks	4.1
Other	1.0
SUBTOTAL	61.7%
WAYSIDE EQUIPMENT	
False Occupancy or Routing	4.8
Track Structure & Maintenance	0.5
Computer Outages	0.3
Third Rail Outages	0.3
Station Equipment	0.2
Data Transmission System	0.1
SUBTOTAL	6.2%
OPERATIONAL CAUSES	
**End-of-Line Sweeps	9.9
Late Dispatches	4.0
Early Layups	3.5
Train Operator or Central Errors	2.3
End-of-Line Congestion	1.2
Daly City Spur Movements	1.0
Operational Decisions	0.9
Other	0.7
SUBTOTAL	23.3%
OTHER CAUSES	
Vandalism to Vehicles	1.8
#Construction, KE Track	1.7
##Construction, Daly City Turnback	1.7
Ill Patron	1.0
P.G.&E. Outage	0.7
Vandalism to Wayside Equipment	0.5
Wayside Fires	0.4
Other	1.0
SUBTOTAL	8.8%
GRAND TOTAL	100.0%

*Eliminated with PUC authorization to remove derail bars as of July 1986.

**End-of-Line sweeps eliminated August 1986.

#Automatic train operations restored to KE Track January 1986.

##Service disrupting construction phase completed March 1986.

automatic train control system (ATC) for the C-cars and a similar retrofit for all existing A-cars. The current A-car ATC units comprise the principal cause of service disrupting failures on the system. As such, the reduction of headways to 2.25 minutes with the existing units is not possible where maintaining patron- and train ontime objectives under higher density train operations is considered paramount. The new units are expected to reduce ATC related delays by a factor of 25 to 1. Testing of the new units in the prototype C-cars has yielded very favorable results to date.

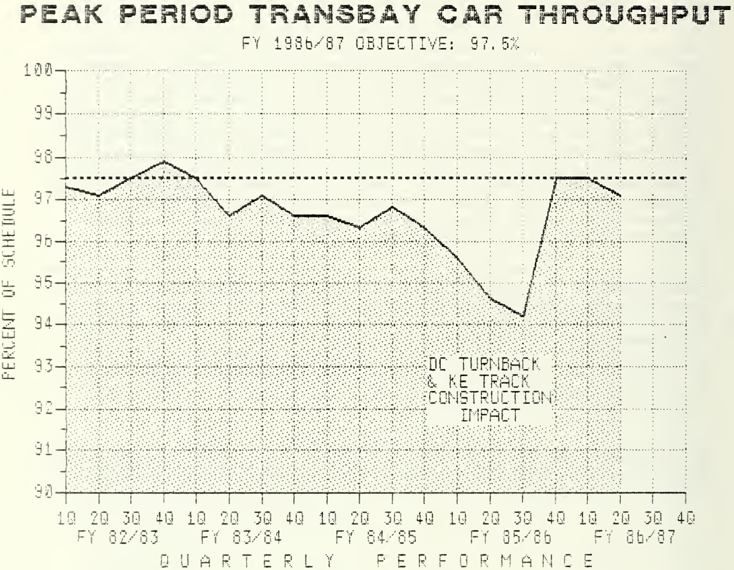
TRANSBAY THROUGHPUT

The transportation corridor between San Francisco and the East Bay serves the heart of the region and is the Bay Area's most heavily traveled. The San Francisco-Oakland Bay Bridge operates at capacity during an extended morning and evening peak period each weekday, and traffic congestion on weekends and holidays can be equally as heavy. BART currently carries 38% of all Transbay trips during peak hours. With the projected increase in jobs and housing on both sides of the Bay, expanding BART service is the most viable and practical way of providing additional capacity for this corridor. This is reinforced by already very limited parking in San Francisco which has led the City to adopt a "transit first" policy emphasizing non-automobile transportation improvements as a means of realizing land-use objectives and preserving the character of downtown and neighborhoods.

To this extent, the Transbay BART link is vital to the region and, as such, is closely monitored in terms of patron flows and train service provided. Peak period Transbay throughput has emerged as a key District indicator which tracks the delivery of capacity relative to schedule. The District has had a long-standing objective to provide a minimum of 97.5% of scheduled Transbay car throughput for peak period service in the peak direction. Thus, if cars are available when needed, trains dispatched per schedule, and delay events held to within acceptable limits, available capacity can be provided as scheduled in this vital corridor.

Figure 29 presents District performance with respect to peak period Transbay car throughput. While performance has generally been within 1 percentage point of the desired 97.5% objective during the 3-year period FY 1982/83 to FY 1984/85, a very noticeable dip occurred in FY 1985/86 as the result of Daly

Figure 29


PEAK PERIOD TRANSBAY CAR THROUGHPUT
FY 1986/87 OBJECTIVE: 97.5%
100
99
98
97
96
95
94
93
92
91
90
PERCENT OF SCHEDULE
DC TURNBACK
& KE TRACK
CONSTRUCTION
IMPACT
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

City Turnback and KE Track construction. During this time period, the cars and trains scheduled to make the Transbay crossing either were late or a some were not provided (i.e., operational decisions to avoid delays necessitated early train turnbacks, etc.). Following the completion of this construction, throughput rebounded to the 97.5% objective level.

Maintaining throughput performance is essential for meeting maximum system demand and achieving the District's load factor objective. This will become increasingly more challenging as more online trains are added and Transbay headways are reduced from the current minimum of 3.75 minutes to 2.25 minutes (and peak direction service increased from 17 trains per hour currently to 25 trains per hour). The corresponding planned increase in capacity will result in a 59% gain in car throughput during the peak hour (157 cars currently versus 249 cars by mid 1991). This will place additional emphasis on maintaining current reliability standards under higher density train operations to assure the provision of adequate Transbay capacity.

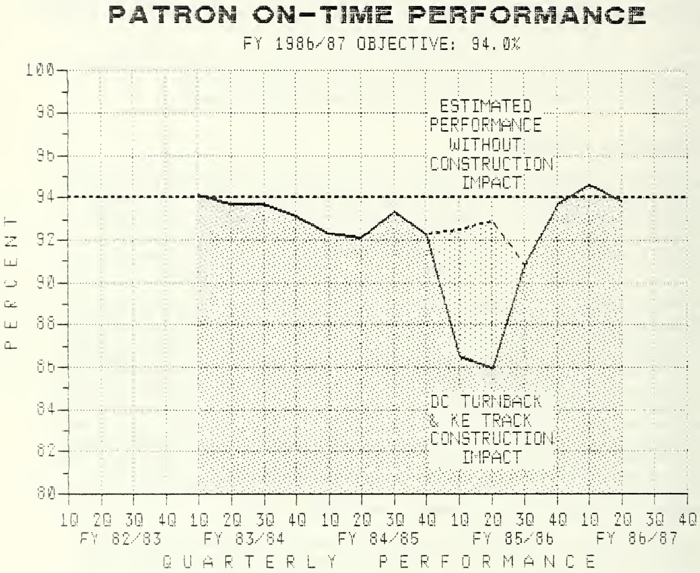
PATRON ONTIME PERFORMANCE

Patron ontime characterizes overall train performance perhaps better than any other single indicator. Whereas train ontime performance is an accepted industry-wide standard (one which the District also tracks), it is BART's extensive train history and faregate data systems that have enabled the District to implement a program which reports actual travel and waiting time delays for patron trips versus scheduled station-to-station train times.

Figure 30 summarizes District performance for the past 3-1/2 years since the inception of the patron ontime monitoring program in July 1983. As shown, patron ontime averaged within 2 percentage points of the 94% objective during FY 1983/84 and FY 1984/85. Construction for the Daly City Turnback and KE Track severely impacted patron ontime performance in FY 1985/86, particularly during the first and second quarters when simultaneous construction for these projects had a compounding effect. More recent performance is very favorable, with patron ontime averaging at the 94% objective level over the last three quarters since completion of the KE Track and subsequent construction phases for the Daly City Turnback ceased to impact operations. This rebound of over 8 percentage points is very important, one that is readily perceived by patrons, and one that reflects the sensitivity of the patron ontime measure to movement for other train performance indicators.

As such, efforts to improve performance with regard to other train service indicators will be reflected by incremental gains for patron ontime. One example of this is the District's successful efforts to remove vehicle derail bars which required PUC authorization (granted July 1986). This action had an immediate favorable impact on train performance which reflected reduced rates for passenger offloads and train delays and gains for dispatches completed and train ontime. In view of the experience of the Daly City Turnback and KE Track construction impact on scheduled service, which lasted almost three full quarters, the District will need to formulate mitigation measures to allow for the phasing in of capacity expansion program projects while continuing to provide high quality service as best measured by patron ontime performance.

Figure 30


PATRON ON-TIME PERFORMANCE
FY 1986/87 OBJECTIVE: 94.0%
100
98
96
94
92
90
88
86
84
82
80
PERCENT
ESTIMATED PERFORMANCE WITHOUT CONSTRUCTION IMPACT
DC TURNBACK & KE TRACK CONSTRUCTION IMPACT
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

AUTOMATIC FARE COLLECTION SYSTEM

The efficient movement of people on BART also includes consideration of station flows. As the primary mechanism for collecting passenger revenue and travel data, AFC equipment must perform at high standards. Performance of this vital station equipment is essential to ensure unimpeded system ingress and egress. Unavailable faregates or ticket vendors, for example, effectively constrain station patron flows and can result in delays due to queing. Since all patrons must use AFC equipment at least twice each trip, the District has identified the AFC incident rate as a key performance indicator. Figure 31 summarizes AFC performance for the past 4-1/2 years. As shown by the horizontal dashed line, the objective is to maintain AFC performance at a rate not to exceed 0.30 incidents per 1,000 trips (this translates to 60 AFC incidents requiring technician assistance per average weekday at 200,000 trips).

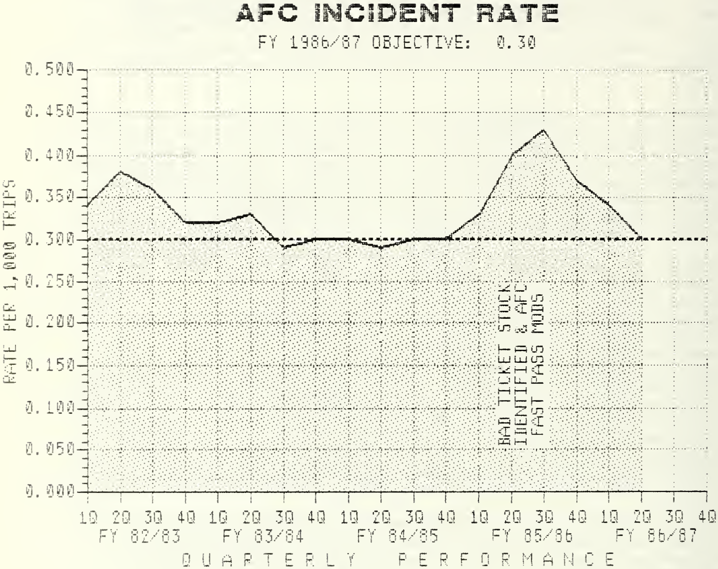
The long-term trend with respect to AFC equipment performance is one marked by steady improvement with the rate dropping from an average of 0.65 incidents per 1,000 trips in FY 1977/78, to 0.35 in FY 1982/83, and to the objective rate of 0.30 incidents per 1,000 trips in FY 1984/85. Component modifications implemented over the years and a program completed in 1985 that optimized usage of the more reliable IBM equipment (versus equipment manufactured by Cubic) by strategically placing them in the most heavily utilized locations, assisted in improving AFC reliability.

While most recent performance is favorable relative to the 0.30 incidents per 1,000 trips objective, two events in FY 1985/86 caused the rate to increase, peaking in the third quarter at 0.43 incidents per 1,000 trips. The first event was the result of the distribution and use of faulty ticket stock which was later identified and remaining batches pulled from circulation (faulty tickets which were already in circulation, however, continued to result in higher than desired AFC incidents). The second event which simultaneously contributed to higher than desired AFC incidents was the modifications of all IBM faregates as part of implementing the AC/BART Plus Ticket (which has been in use since February 1, 1987). The stored monetary value of previously circulated faulty tickets has, for all practical purposes, been consumed and AFC equipment tolerances with respect to the faregate modifications have been corrected. As a result, AFC performance has been restored to its previous favorable level of 0.30 incidents per 1,000 trips.

Further assisting in the efficient movement of passengers through stations is favorable performance for elevators and escalators. Modifications to elevators are being implemented as part of improving access for elderly and handicapped patrons (this project is discussed further under "Station Improvements for Elderly and Handicapped Patrons"). Station escalators are also undergoing extensive refurbishment to improve performance (see "Patron Movement" section, below).

Achieving high standards for AFC performance, elevators, and escalators is essential for maintaining smooth and unimpeded passenger flows between train platform and street levels. The impact of increased ridership on current vital station equipment will also need to be fully examined.

Figure 31


AFC INCIDENT RATE
FY 1986/87 OBJECTIVE: 0.30
RATE PER 1,000 TRIPS
0.500
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
BAD TICKET STOCK IDENTIFIED & AFC FAST PASS MODS
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

RIDERSHIP

The historical perspective and recent trends regarding BART ridership were fully discussed in Chapter I and are summarized graphically in Figure 31a. This section focuses on BART-controlled service attributes in addition to train performance (i.e., service frequency, reliability, etc.) which also have an impact on system ridership. These non-train performance attributes are used to evaluate District performance in terms of identifying deficiencies, which are translated into a strategic action plan. The discussion is organized on the basis of patron "experiences" that figure into individual decisions of whether to use BART. These patron perceived experiences are:

ACCESS: The convenience of getting to and from the system in terms of completing a trip from origin to ultimate destination.

STATIONS: The ease of entering the system and navigating through stations between street and train platform levels.

TRAINS: The level of comfort and other amenities afforded while onboard trains.

Safety, information availability, and overall system appearance (i.e., cleanliness) figure into these experiences and are discussed under appropriate sections.

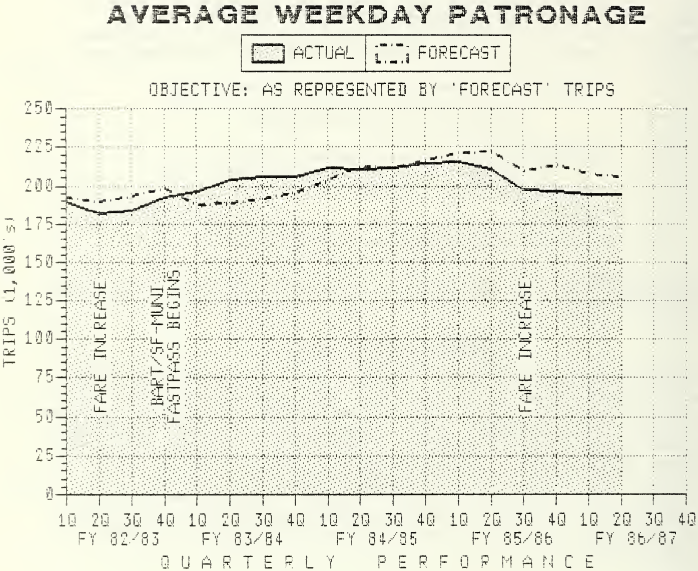
PATRON EXPERIENCE: ACCESS

The District has identified and implemented a variety of access improvements over its almost 15 year operating history. These include additional parking, express bus and shuttle bus service, improved schedule and fare coordination with local transit operators, bicycle storage racks and lockers, and a carpool program. The fact remains, however, that of all the improvements implemented to date, none has been as favorably received (in terms of utilization) as parking. While this has led to more aggressive actions regarding parking (including the discouragement of casual carpoolers' use of round-trip BART patron parking), the District's access program continues to be multifaceted with emphasis on parking expansion and a range of non-automobile elements as discussed below.

Parking

Past studies have shown BART's potential market to be on the order of 4 to 5 times greater than current actual system usage. This is based on an analysis of population residing within 3 miles of a BART station and traveling more than 5 miles to a work location which is within 1 mile of a station. Highway congestion and auto operating costs, which greatly offset the attractiveness of auto usage, have given rise to questions concerning possible BART access deficiencies and their impact on system ridership. It follows that lack of adequate station parking may be a key factor deterring many would-be BART users. With approximately 96% of the 24,864 paved spaces at the 24 stations which provide parking filled by 10 a.m. each weekday, this has indeed been shown to be the case. It has been estimated that the system has a parking

Figure 31a


AVERAGE WEEKDAY PATRONAGE
ACTUAL
FORECAST
OBJECTIVE: AS REPRESENTED BY 'FORECAST' TRIPS
TRIPS (1,000's)
250
225
200
175
150
125
100
75
50
25
0
FARE INCREASE
BART/SF-MUNI FASTPASS BEGINS
FARE INCREASE
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

deficiency of approximately 10,000 spaces relative to the current inventory, a shortage that translates to approximately 20,000 trips per average commute weekday and $7.6 million in potential lost passenger revenue per year. Evidence of the relative importance of parking is further substantiated by the 1985 Passenger Profile Survey which found that 20% of infrequent system users do not ride BART more often because of parking difficulties. The study also found that 35% of typical commute-day riders drive and park at or near a station. Because of inadequate station parking, just over one in four of these drivers must park on adjacent local streets or in nearby privately operated (fee) parking facilities.

These findings, which are reinforced by concerns of impacted communities, have led to an increased emphasis on parking expansion, particularly for stations in outlying suburban areas where BART access via local transit may be limited or unavailable. Although over 44% more parking is provided now versus when Transbay service first started in 1974, Passenger Profile and Latent Demand Survey data clearly indicate that the gains made over the past 13 years are insufficient to accommodate potential demand and have contributed to the suppression of system usage. To assist in reducing the deficiency, the District will continue to implement its parking expansion program as detailed in Volume II. The plan calls for adding 1,894 paved spaces in FY 1987/88 and an additional 8,590 spaces in the remainder of the five-year planning period as summarized in Figure 32.

BART Express Bus and Local Transit Access

Local transit is an important mode of access to BART, particularly within the service areas of MUNI and AC Transit, whereas less frequent and less extensive local transit service in outlying suburban areas has resulted in greater reliance on the automobile. BART actively participates in the MTC sponsored Regional Transit Authority (RTA) along with other Bay Area transit operators for the purpose of maximizing patronage and revenues for all systems through the coordination of fares and services. Coordination efforts with AC Transit have resulted in local service revisions to bus routes and schedules. Further, BART continues to fund selected routes operated by AC Transit providing needed access to East Bay rail stations. Efforts to coordinate fares and to implement joint passes are an important aspect of BART's access program (this is discussed in greater detail in the "Fare Payment" section below).

The importance of relieving a portion of the parking pressures at outlying suburban stations has placed added emphasis on coordinating services for BART funded express bus service and also for service provided by Central Contra Costa County Transit Authority. CCCTA has for several years been revising its bus schedules (i.e., arrival and departure times at BART stations) to better match train schedules. This effort is continuing with both CCCTA and AC Transit as the lead agencies. BART has taken the lead with respect to similar actions which resulted in improved coordination of AC operated BART express bus service and train operations. BART's access program calls for continued efforts to coordinate services between local transit and rail operations. This is particularly important with respect to AC Transit which provides access to 20 of BART's 34 stations. During FY 1987/88, BART will pursue improved bus/rail coordination with AC Transit by advocating revisions to bus arrivals and departures at BART stations and making printed bus/rail schedules available to the public.

Figure 32

DECEMBER 1986 BART-OWNED PARKING SPACE INVENTORY AND PROGRAMMED EXPANSION PAVED FACILITIES AT EXISTING RAIL STATIONS AND EXPRESS BUS PARK/RIDE LOTS

	STATION	SPACES AS OF DECEMBER 1986	PROGRAMMED ADDITIONS			PLANNED SPACES AS OF JUNE 1992
			JAN-JUN 87	FY 1987/88	FY 88/89 - 91/92	
SAN FRANCISCO LINE:	Daly City	1,877	0	0	0	1,877
	Glen Park	55	0	0	0	55
	Oakland West	403	0	0	730	1,133
	SUBTOTAL	**2,335**	**0**	**0**	**730**	**3,065**
FREMONT LINE:	Fremont	1,983	0	405	0	2,388
	Union City	1,166	0	0	200	1,366
	South Hayward	1,252	0	0	0	1,252
	Hayward	967	0	0	300	1,267
	Bayfair	1,761	0	0	600	2,361
	San Leandro	1,066	0	170	0	1,236
	Coliseum	923	0	0	0	923
	Fruitvale	787	0	248	560	1,035
	Lake Merritt	190 b)	0	0	400	590
	SUBTOTAL	**10,095**	**0**	**823**	**2,060**	**12,978**
RICHMOND LINE:	Richmond	754	0	0	0	754
	El Cerrito del Norte	1,607	0	0	840	2,447
	El Cerrito Plaza	509	0	254	0	763
	North Berkeley	524	0	252	0	776
	Ashby	560	0	0	0	560
	MacArthur	609	0	0	640	1,249
	SUBTOTAL	**4,563**	**0**	**506**	**1,480**	**6,549**
CONCORD LINE:	Concord	1,912	0	0	1,200	3,112
	Pleasant Hill	1,678	0	0	800	2,478
	Walnut Creek	1,263	0	0	1,120	2,383
	Lafayette	730(c)	0	323	700	1,753
	Orinda	1,047(d)	0	242	0	1,289
	Rockridge	776	0	0	500	1,276
	SUBTOTAL	**7,406**	0	**565**	**4,320**	**12,291**
TOTAL: RAIL STATIONS		**24,399**	**0**	**1,894**	**8,590**	**34,883**
BART EXPRESS BUS PARK/RIDE FACILITIES:						
	North Concord/Martinez	0	500	0	0	500
	West Pittsburg	213	0	0	0	213
	Pittsburg	0	0	0	200	200
	West Antioch	0	0	0	200	200
	East Antioch	252	0	0	0	252
	Dublin	0	0	0	1,400	1,400
	West Livermore	0	0	0	200	200
	Hercules	0	0	0	300	300
TOTAL: EXPRESS BUS PARK/RIDE		**465**	**500**	**0**	**2,300**	**3,265**
GRAND TOTAL: RAIL AND EXPRESS BUS		**24,864**	**500**	**1,894**	**10,890**	**38,148**

(b) A 25¢ parking charge is in effect at Lake Merritt Station. All other BART-owned parking is free.

(c) An additional 403 spaces are provided in a BART-owned gravel lot at Lafayette Station; these will be paved in FY 87/88.

(d) An additional 41 spaces are provided in a BART-owned gravel lot at Orinda Station; these will be paved in FY 87/88.

For express bus operations in FY 1987/88, BART plans call for the introduction of a combined express bus/rail ticket and streamlining service in the West Contra Costa (I-80) corridor. The District will also retain the 95% ontime performance criterion as part of negotiating a new purchase of service contract for express bus operations.

Elderly and Handicapped Patron System Access

The BART Task Force on Access for Elderly and Handicapped Persons meets regularly with District staff for the purpose of identifying projects which may improve BART accessibility for mobility, vision, and hearing impaired patrons. This includes consideration for access to and from the system, movement through stations, and accommodating special needs on-board trains. Improvements implemented over the years which have enhanced elderly and handicapped patron access to the system include providing wheelchair lift equipped buses for BART express bus service, designating close-in station parking, and ongoing implementation of the District's curb cut program to accommodate patrons in wheelchairs (other projects for stations and onboard trains are discussed in appropriate sections below). Additionally, the District provides system information via TTY equipment for patrons unable to a access BART's telephone information service.

PATRON EXPERIENCE: STATIONS

Convenience is clearly an important factor which enters into an individual's decision concerning mode choice. It follows that the relative ease of using the BART system affects ridership. This section addresses the service qualities which assist patrons in "navigating" through stations, between street-level entry points and train platforms. The discussion focuses on availability of information, fare payment mechanisms, method of assisting patron movement among the various station levels, patron safety and security, and system appearance. The special needs of elderly and handicapped patrons are discussed in a separate section.

Information Availability

The availability of information is an important factor which impacts how easily the system can be used. This is especially critical for first-time users or infrequent riders who may be unfamiliar about fares, routes, schedules, etc. The District has a comprehensive program to disseminate information to patrons through BART published material and public address announcements, station maps and signage, maintaining connecting local transit schedule information stock (provided by other operators), and print and broadcast media. Based on the results of the 1985 Passenger Profile Survey, between 20% and 30% of all surveyed riders indicated an importance for having available: train schedules, local bus information, station area maps, and information on how to use BART to get to theatres and other places of entertainment near stations. Less than 4% of the riders surveyed indicated a need to have additional information regarding ticket machine use or how to get around inside stations. Based on this survey and regularly logged consumer complaints, BART's uniform signage system appears to be functioning adequately.

Updates of BART schedule and fare information are available at all stations in addition to brochures which are printed in three languages describing how to use the system and points of interest located near stations. A program to enhance and update the current maps displayed in each station is well underway. The 12th Street Station prototype information panels project is to be completed prior to the close of FY 1986/87 with similar displays to be implemented at other stations (this project is included in BART's 1985/86 Productivity Improvement Program).

Station agents are also an important source of information and assistance to patrons. In recognition of this, the District has a long-standing objective regarding public contact employee courtesy and helpfulness. Performance is measured in terms of patron complaints about employees and is closely monitored for the purpose of rectifying problems through the District's employee training and counseling program.

Public address system announcements in stations are essential for keeping patrons informed as to train locations, special service announcements, and other service and safety concerns. These announcements assist in maintaining safe patron flows and in the making of patron decisions concerning best (i.e., fastest) routing for trips which may require a transfer or in the case where trains may be delayed. The District will continue to make every effort to keep passengers informed by providing service update announcements, particularly with regard to unanticipated service delays. Transportation behavioral research studies have repeatedly shown that passenger "wait time" is valued more (i.e., perceived to be longer) than "in-vehicle time". Additional emphasis is given to the value of time with respect to work related travel which, for the most part, is schedule oriented. As such, District efforts will be particularly sensitive and responsive to patron information needs during peak commute hours.

Fare Payment

Access to tickets and methods of fare payment directly impact the relative ease of using BART. In addition to providing AFC equipment at all stations to vend regular adult tickets, the District has implemented other fare payment mechanisms for added convenience and cost savings to patrons. The District's Tickets-To-Go Program currently includes 150 offsite ticket sales outlets in the three BART District counties and additional outlets in Santa Clara and San Mateo counties (expansion of the number of offsite ticket sales outlets was included in BART's FY 1985/86 Productivity Improvement Program). This has proven to be an effective means of increasing BART ticket availability while also relieving some of the pressure on station AFC vending equipment. Offsite ticket sales outlets consist primarily of participating branches of banking institutions which sell discounted high value regular adult tickets ($32 tickets for $30) as well as discounted tickets to students and elderly and handicapped persons (90% discount). Other offsite outlets include a variety of small businesses and community organizations. In addition to these outlets are 50 large firms which also distribute BART tickets to their employees. Discounted tickets are only available at offsite outlets.

The importance of this program has long been recognized. BART's visibility is increased, while at the same time making tickets more easily obtainable and at a discount. In recognition of the mutual benefits to the patron and to BART, the District will continue to pursue expanding the number of offsite ticket outlets.

An improvement for promoting additional ridership by making the system more convenient and easier to use is a combined BART/local transit pass. The combined monthly BART/MUNI pass which first became available in April 1983 provides unlimited use of both systems for travel within San Francisco. In February 1987, the joint AC/BART Plus Ticket was introduced. This latter combined fare payment mechanism functions much as a regular ticket on BART with unlimited use of AC bus service during each semi-monthly period. These two passes eliminate the need for transfers or double fare payment and, together with more coordinated bus/train service, has greatly enhanced the convenience of using BART. Ridership with respect to the BART/MUNI pass has nearly doubled in the past 4 years, from approximately 16,000 average weekday BART trips with this pass during the first year of its availability to over 31,000 pass trips during February 1987. The availability of these innovative fare payment mechanisms also provides an added incentive to use local transit for access to BART. This is particularly critical for East Bay stations where parking pressures are greatest (refer to the "Parking" section above). To assist in promoting the recently implemented AC/BART pass, the District will be providing special ticket booths at selected San Francisco and Oakland downtown stations beginning May 1987.

Patron Movement

The importance of maintaining unimpeded station pedestrian flow was emphasized above with respect to performance for the automatic fare collection system consisting of entry/exit gates, ticket vendors, change machines, and add-fare machines. In addition to this vital station equipment are escalators and elevators which assist in the movement of patrons among the various station levels (i.e., street level, concourse, and train platform). Availability of escalators and elevators is particularly important with regard to elderly and handicapped patrons, many of whom may not be capable of negotiating stairs (additional details for elderly and handicapped patron movement through stations are presented in a separate section below).

The District recognizes the special maintenance requirements of exterior escalators which are exposed to the weather. The escalator refurbishment program is the result of this and is currently underway with its completion scheduled for February 1990. Key component parts are being replaced and the speed of selected units slowed by 25% in order to improve reliability. The "downtime" for each unit under this program is typically 4 to 6 weeks with no more than 6 units out for refurbishment at any one time systemwide. While escalator performance has been favorable relative to the District's availability objective, this relatively lengthy downtime for refurbishment has contributed to increased patron complaints.

BART will be scheduling the removal of escalators from service for this program in a way to minimize patron inconvenience. The FY 1987/88 availability objectives for escalators and elevators are more stringent relative to prior years, in recognition of the need to maintain high performance for this equipment. Additionally, the District will be working with the cities of San Francisco and Oakland for the purpose of seeking revisions to existing local ordinances prohibiting the enclosure of subway station entrances, which is an effective means of improving escalator performance for exposed units.

Safety and Security

BART ridership is also influenced by individual perceptions and experiences concerning the system's safety and security. BART's record in this extremely important area of operations is very favorable relative to other modes and U.S. rail systems. As of February 1987 BART has carried 597.2 million passengers 7.8 billion passenger miles without a single patron fatality. The number and types of patron accidents have remained fairly constant over the years with those occurring in stations averaging 55 to 65 per month. Slips and falls on stairways and escalators constitute approximately 75% of all reported patron accidents (the remaining 25% are related to train operations, and are discussed under Train safety and security, below).

Patron safety has always been of paramount concern to the District. As such, facilities and operations planning are performed in concert with BART's Safety Department to assure adherence to accepted industrywide safety standards. Numerous improvements have been made in BART's almost 15-year operating history in addition to the safety features included in the system's original design. These include modifications to vehicles, stations, right-of-way protection, and parking areas. Further, the experience of the 1979 Transbay Tube fire and follow-up investigation provided BART and the entire transit industry with greater insight regarding emergency preparedness and life safety. The recommendations of this investigation were incorporated into an aggressive program to improve the safety of facilities and operations even further. Major projects include the replacement of all vehicle seat cushions and covers with low-smoke/flame-resistant material and the fire hardening of all vehicles.

Equally as important has been the 1981 publication of an extensive and detailed emergency plan for BART which was developed in cooperation with local emergency service agencies. This has led to improved communications coordination and a better understanding of the BART system on the part of local fire departments and other emergency service providers. BART facility tours and drills are conducted on an on-going basis to assure proper emergency response for critical situations at all system locations.

The capability to evacuate patrons safely from BART stations has also been analyzed. As a result of this effort, two new platform-to-concourse stairways will be constructed at both ends of Embarcadero Station.

Similar consideration is given to patron security. The establishment of BART Police Services prior to the start-up of revenue operations in September 1972 was an early recognition of the District's special security requirements. Patron security has subsequently been emphasized throughout BART's planning and operational history. The effective deployment of BART police will be the prime strategy for combatting crime on trains, in station areas, and along track rights-of-way. Computer programs for tracking and dispatching police officers will continue to be used, as well as other information systems for the accurate and timely reporting of crime data.

Station Appearance

Concern for system cleanliness is reflected in the relative absence of graffiti and overall favorable appearance of BART facilities. This enhances the system's appeal in terms of the patron's experience and, therefore, contributes towards promoting additional ridership. The District's maintenance program for cleanliness is routinely monitored and reported to management and the Board of Directors along with other areas of performance. Regular inspection of station facilities and trains (vehicle cleanliness is discussed in the "Trains" section below) has assisted BART in achieving its established cleanliness standards. This program is to remain in place with related cleanliness objectives made more stringent and carried forth into the current planning timeframe, assuring that the system's favorable appearance is maintained.

Station Improvements for Elderly and Handicapped Patrons

Prior to the start-up of revenue service in September 1972, the system was retrofitted to accommodate special needs of persons in wheelchairs and for other mobility considerations. Numerous station improvements have been made over the years including installation of elevators, electronically controlled doors, special ramps, raised markers and railings on platforms, and restroom modifications. These and other improvements in parking lots and on trains have been implemented primarily as the result of deficiencies which were identified by the BART Task Force on Access for Elderly and Handicapped Persons.

More recent efforts to improve elderly and handicapped patron mobility within stations are being addressed by two important projects. The elevator improvement project includes installation of card readers, intercoms, closed circuit television, new call buttons, and lowering of control panels. These enhancements have been installed in prototype form for elevators at Berkeley and El Cerrito del Norte stations. Plans call for completing 75% of Phase II for this project by June 1988.

The second improvement, the platform edge project, addresses movement through stations for vision impaired patrons. Plans call for completing installation of brightly colored and textured tiles along all station platform edges by June 1988.

Further assisting elderly and handicapped patron movement through stations is the availability of BART tickets at local banking institutions, senior citizen clubs, and other organizations. In addition to providing a 90% discount to qualified individuals, the offsite purchase of tickets allows elderly and handicapped patrons to by-pass ticket vendors and change machines.

PATRON EXPERIENCE: TRAINS

Concerns for patron experience onboard trains are grouped as to information availability, load factors, safety and security, appearance, and special needs for elderly and handicapped patrons.

Information Availability

Train operator announcements are an important means of communicating information to on-board passengers concerning service and safety. This aspect of train operations is routinely monitored in the District's Passenger Services Sampling Survey which focuses on announcements regarding: arrival station, transfer points, and service delays. Additional information is available in the form of schematic system maps which are located at each side door on all cars. Patrons may also contact the train operator via the onboard intercom system with units located at both ends of all cars.

Load Factors

Perhaps the foremost aspect of patron onboard experience (one which directly impacts ridership) is train occupancy as measured by the ratio of passengers to seats, or load factor. This measure was fully discussed in Chapter I in terms of peak period ridership growth and BART's limited capability to reduce train loadings until additional capacity becomes available. While load factors have declined somewhat with reduced levels of ridership over the past year, the most recent upturn in patronage suggests that higher train occupancy is definitely in BART's future. Further, the effective use of the new C-cars, which will start arriving in July 1987, cannot be fully realized until key capacity expansion projects are completed and headways reduced. The next headway reduction to 3 minutes 10 seconds is currently scheduled to take place in September 1988. Until that time, the District will make every effort to balance peak period load factors across all four routes.

Safety and Security

Onboard patron security is addressed by the effective deployment of BART police. As stated previously, the District will continue surveillance of trains, stations, and other BART property.

The level of patron accidents onboard trains has remained fairly constant over the years. Typically 15 to 20 accidents occur each month. Three-fourths of these involve falls onboard trains, being struck by car doors, and gap falls (i.e., the 2 to 3 inch space between the vehicle floor and the station platform). Train operator announcements regarding door closure and care when entering and exiting trains will continue to assist in minimizing these types of accidents.

The phasing in of higher frequency BART service is inherently linked to adherence to stringent safety design criteria. The removal of the PUC subway vent separation requirement, now scheduled to take place in October 1987, is one important safety related step needed for achieving expanded capacity. The August 1986 completion of the District's fire hardening program is a key element and prerequisite for PUC approval. Other improvements implemented to date include the installation of emergency procedure posters on all cars, additional hand rails, replacement of all seat cushions and covers with low smoke/flame resistant material, and routinely scheduled safety drills involving local emergency service providers (a minimum of one drill each month is conducted).

Train Appearance

Interior and exterior cleaning is performed in the three East Bay yards. Routine monitoring and reporting of performance has assured the achievement of the District's established standards for car cleanliness. Efforts to achieve higher standards for FY 1987/88 will further enhance the life of BART's A- and B-car fleet which is approaching 15 years of age. Additionally, maintaining stringent car cleanliness standards will ensure that the service provided by the A- and B-cars is on par with the new C-cars.

Vehicle Improvements for Elderly and Handicapped Patrons

In addition to the above, the special needs of elderly and handicapped patrons have led to the installation of signs on all cars indicating priority seating for mobility impaired persons. Consideration is being given to providing additional space for patrons in wheelchairs on the C-cars.

FINANCIAL PERFORMANCE

BART financial performance is directly linked to system productivity, a critical aspect of operations and capital planning which is in the forefront of management concerns. The District's participation in the MTC sponsored Regional Transit Productivity Committee has assisted in the identification of projects and programs to improve operational efficiency and productivity. Prior year Productivity Improvement Program (PIP) submittals to MTC reflect the District's efforts to continue to improve performance (see Figure 33 for the status of BART's FY 1985/86 PIP, the last submittal prior to MTC's revisions of this program).

BART financial performance can be expressed in terms of the operating cost of delivering service versus revenue returns. As seen in Figure 34, BART's cost per car mile in constant 1977/78 dollars declined significantly between FY 1977/78 and FY 1980/81, and has remained fairly stable since the start up of 4-route close headways service in mid 1980. The cost per passenger experienced a similar decline, which continued through FY 1984/85 reflecting increased ridership. The slight upturn for the cost per passenger beginning in FY 1985/86 corresponds to reduced levels of ridership for that period.

Figure 35 presents District productivity in terms of car mile output versus the cost per passenger mile which is expressed in constant 1977/78 dollars. Compared to the previous figure (which presents ridership and expense), a similar pattern of productivity is apparent: significant gains between FY 1977/78 and FY 1981/82, stable performance between FY 1981/82 and FY 1984/85, and an unfavorable turn beginning in FY 1985/86. This latter unfavorable

FIGURE 33

STATUS FOR BART'S 1985 PRODUCTIVITY IMPROVEMENT PROGRAM OBJECTIVES

(As of February 1987)

PIP ELEMENT	FY 1985/86 OBJECTIVE*	FEBRUARY 1987 STATUS
Comprehensive Marketing Program	Average Weekday Offpeak Trips (109,600)	98,020 (for month of February 1987)
(Short-Term)	Average Saturday Trips (89,800)	88,184 (for month of February 1987)
	Average Sunday Trips (51,600)	44,318 (for month of February 1987)
	Rail operating cost per passenger mile (18.5¢)	21.2¢ (YTD July 1986 - February 1987)
	Rail farebox ratio (43.0%)	51.9% (YTD July 1986 - February 1987)
	Rail passenger revenue per seat-mile (3.3¢)	3.4¢ (YTD July 1986 - February 1987)
	Offsite ticket sales outlets -- number by year end (168)	197 as of the end of February 1987
Capacity Expansion Program	**Targeted Project Completion Dates and Milestones for the Following Projects**	
(Long-Term)	KE Track (November 1985), project complete by November 1985	KE Track completed and operational in March 1986.
	New ATC Prototype (October 1985) Production release by October 1985	Progress continues concurrently with C-Car testing a production.
	Vehicle Fire Hardening (September 1986), Complete 420 Cars by June 1986	Entire operating fleet of 437 cars fire hardened as o August 1986.
	Integrated Control System, Phases I & II (Phase I = January 1987, Phase II = December 1987), complete software production by April 1986	Project reconfigured. Estimated completion is October 1989.
	Second Generation Transit Vehicles (schedule under review), prototype delivery by August 1985	Prototype cars delivered in October 1985. Delivery o production cars to begin June 1987 with the receipt o the last of 150 cars by December 1988.
	Daly City Turnback (December 1987), complete civil construction by April 1986	Civil/structural construction work is 98% complete.
	Daly City Yard (March 1988), complete design by November 1985	Design complete. Notice to proceed with civil/structural contract. Excavation has begun.

* Objectives are consistent with those reported to the RTPC in September 1985 based on the District's Draft FY 1985/86 Budget.

Figure 34

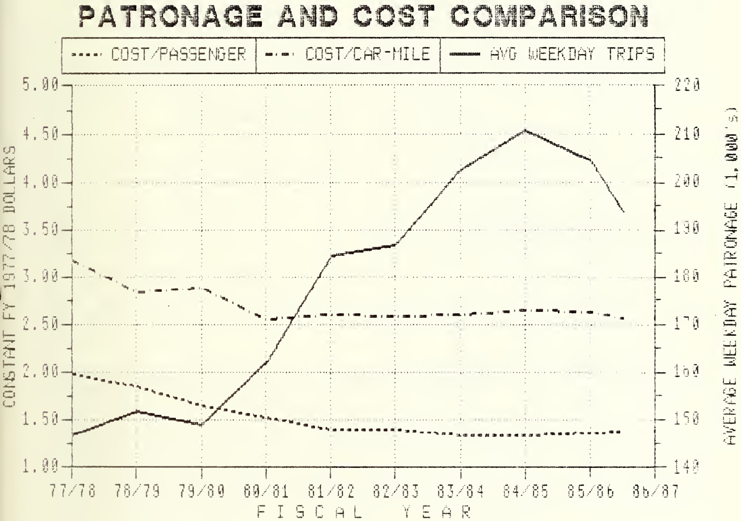
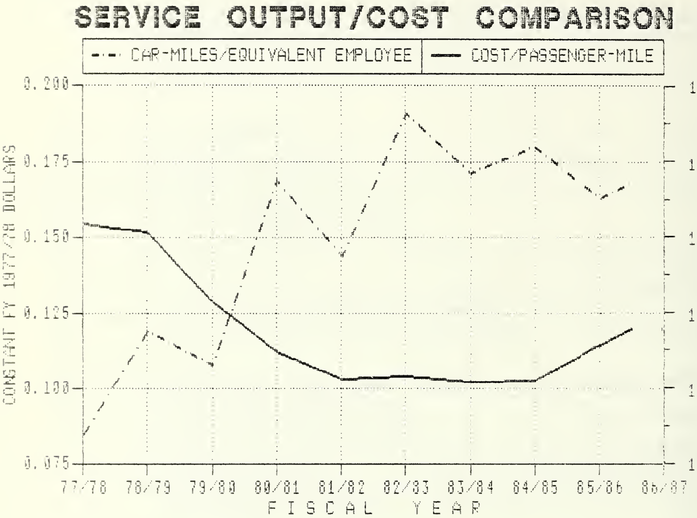

PATRONAGE AND COST COMPARISON
COST/PASSENGER
COST/CAR-MILE
AVG WEEKDAY TRIPS
CONSTANT FY 1977/78 DOLLARS
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
AVERAGE WEEKDAY PATRONAGE (1,000's)
220
210
200
190
180
170
160
150
140
77/78
78/79
79/80
80/81
81/82
82/83
83/84
84/85
85/86
86/87
FISCAL YEAR

Figure 35


SERVICE OUTPUT/COST COMPARISON
CAR-MILES/EQUIVALENT EMPLOYEE
COST/PASSENGER-MILE
CONSTANT FY 1977/78 DOLLARS
0.200
0.175
0.150
0.125
0.100
0.075
CAR MILES (1,000's)
17
16
15
14
13
12
77/78
78/79
79/80
80/81
81/82
82/83
83/84
84/85
85/86
86/87
FISCAL YEAR

movement for the cost per passenger and car mile output reflects below forecast ridership and concurrent shortening of train lengths (hence, fewer car miles) to meet the District's load factor objectives.

This constant dollar comparison presents BART productivity in real terms with the impact of inflation factored out. Gains made in the period between fiscal years 1977/78 and 1984/85 are solid evidence of BART productivity prior to the ridership downturn in FY 1985/86. The most recent productivity downturn places additional emphasis on the need to evaluate new ways of generating and allocating resources, as well as stimulating ridership and revenue growth. This section of BART's Five Year Plan looks at past and current performance in light of key financial indicators and presents the District's strategy for realizing these gains.

Three measures which best indicate overall financial performance and which are tracked on a monthly basis by the District are:

RAIL FAREBOX RATIO:	The expense of delivering rail service versus the return in rail passenger revenue.
SYSTEM OPERATING RATIO:	The expense of delivering rail and District funded express bus and other contract bus services versus the return in passenger fares and non-passenger revenue.
RAIL COST PER PASSENGER MILE:	The expense of delivering rail service versus system usage as expressed by passenger miles.

Quarterly performance for the past 4-1/2 years relative to these key indicators is presented in Figures 36, 37, and 38. Common to all three is consistently favorable performance up to about the third quarter of FY 1984/85. BART's record since then has been mixed, with performance during FY 1985/86 clearly unfavorable to budget reflecting below forecast ridership and revenues. Favorable performance returned during the first two quarters of FY 1986/87. With passenger revenue for the first half of FY 1986/87 running 6.2% below budget, this latter favorable return reflects the District's efforts to control costs. Opportunities for realizing additional productivity gains lie within the District's ability to continue to keep expenses in line while increasing ridership and passenger revenue.

Three primary expense components which constitute approximately 87% of the District's annual operating budget are labor (65%), electric power (13%), and contract bus services (9%--which includes District funded express bus service, shuttles, and feeder services). Opportunities for realizing greater economies

Figure 36

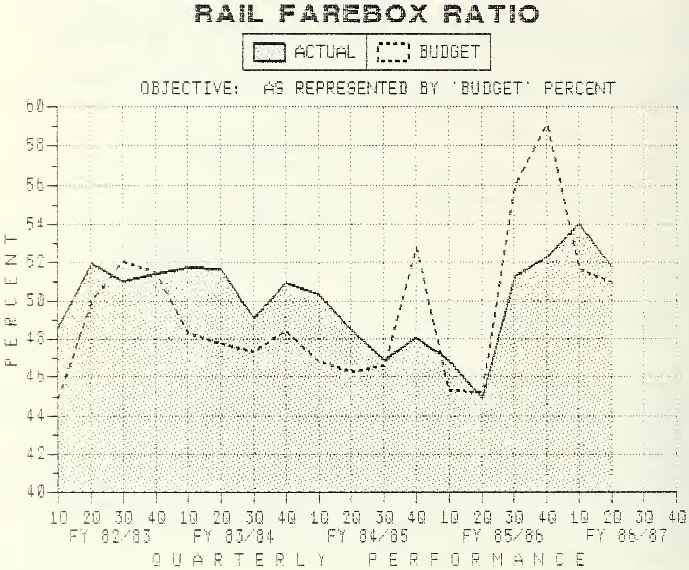

RAIL FAREBOX RATIO
ACTUAL
BUDGET
OBJECTIVE: AS REPRESENTED BY 'BUDGET' PERCENT
PERCENT
60
58
56
54
52
50
48
46
44
42
40
1Q
2Q
3Q
4Q
1Q
2Q
3Q
4Q
1Q
2Q
3Q
4Q
1Q
2Q
3Q
4Q
1Q
2Q
3Q
4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

Figure 37

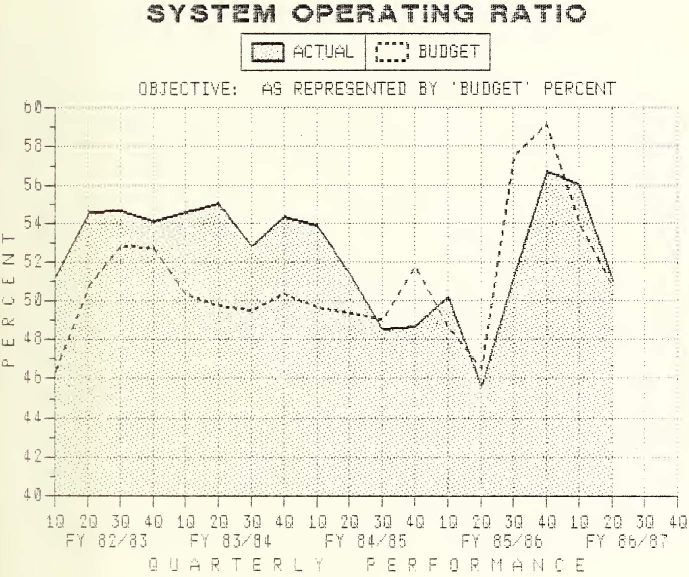
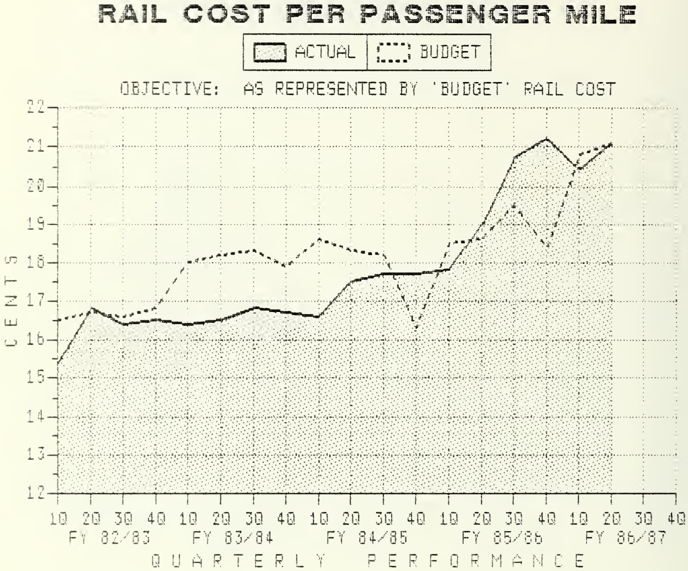

SYSTEM OPERATING RATIO
ACTUAL
BUDGET
OBJECTIVE: AS REPRESENTED BY 'BUDGET' PERCENT
PERCENT
60
58
56
54
52
50
48
46
44
42
40
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

Figure 38


RAIL COST PER PASSENGER MILE
ACTUAL
BUDGET
OBJECTIVE: AS REPRESENTED BY 'BUDGET' RAIL COST
22
21
20
19
18
17
16
15
14
13
12
CENTS
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

and efficiencies within any of these major expense areas, thus represent important means for improving productivity and overall financial performance. Staffing costs comprise the largest component of total operating expense. While this may decline somewhat if electrical energy assumes a larger proportion, staffing cost is the one factor most directly under District control. Staffing levels materially affect labor cost, and to the extent that output can be increased without proportional increases in staffing, future labor cost increases can be held within the limits of available resources. In support of this, are District efforts to maximize employee productivity through control of paid sick leave and lost time due to industrial injuries. As such, the current level of staffing is expected to absorb a portion of the increased work load demands brought on by the phasing in of expanded service. This is particularly relevant with respect to administrative staffing. Increased efficiency and economy of scale are anticipated with regard to maintaining an expanded fleet. Use of the new C-cars in conjunction with the Daly City Yard is central to this effort with reduced maintenance labor requirements due to fewer car miles (i.e., more efficient train sizing and storage). Administrative functions are expected to be performed with only minor incremental staffing increases.

The majority of new positions will be required in response to operating and maintaining more trains and more cars. Minor incremental staffing will be required, particularly for revenue processing and BART police, due to higher patronage. Relative to today, the current service plan is to increase peak period Transbay capacity by 38% by June 1992 and to increase average weekday ridership by 19% to 233,700 trips also by June 1992. This will require only a 9.3% increase in average weekday car miles, which is a key determinant of electric power and maintenance expense. These productivity gains are expected with the addition of 148 full time equivalent positions to BART's current workforce. Additional details concerning BART staffing levels and labor expense are presented in Chapter III of this volume.

Electric power and contract bus service are the two major non-labor components of the District's operating budget. Enhanced operational flexibility with the C-cars and Daly City Turnback and Yard are expected to substantially reduce electric power even though higher service levels are to be provided. This savings is the direct result of more efficient online train sizing with the C-cars and the use of the Daly City Yard for the storage of a portion of BART's fleet not needed during offpeak service. The Daly City Yard will also be used for some overnight storage of trains. Thus, midday and overnight storage of vehicles represents a substantial savings to the District in terms of power cost due to reduced car miles.

The savings to be realized is dependent upon optimum use of the new C-cars and the Daly City Yard. C-car planning is currently underway, and is the principal effort for formulating operational strategies which will enable BART to meet its load factor objective (i.e., provide adequate capacity to meet demand) while minimizing car miles.

In addition to the savings expected with the C-cars and Daly City Yard, the District is also in the process of investigating the possibility of procuring electric power at more favorable rates from sources other than from Pacific Gas & Electric.

Expense for purchased bus transportation (i.e., District funded express bus service, shuttles, and feeder service) has increased 130% over the past 5 years, from a budget of $6.7 million in FY 1981/82 to $15.4 million in FY 1986/87. Part of this increase reflects the additional feeder service expense first negotiated with AC Transit for FY 1984/85. This initial agreement took effect in October 1984 with $3.1 million BART funds supporting 9 months of AC provided feeder bus service. This component of purchased transportation has increased substantially to $7.1 million for the FY 1986/87 budget.

As part of its policy on privatization (see Volume III, Appendix B), the District will continue to pursue expense reductions for providing purchased bus transportation, as well as for other areas of operations relating to the purchase of supplies, equipment, and services. Privatization is closely linked to the District's Joint Development Program which focuses on promoting higher density land uses in the vicinity of BART stations. Joint development efforts have resulted in private sector development proposals including hotel/office complexes at Concord, Pleasant Hill, and Fremont Stations, and an office structure at Lake Merritt Station. This effort is important as a means of expanding BART's financial base through the realization of additional revenue from ground leases and air rights of District property. Increased development densities proximate to stations will also result in an expansion of the market for BART service, thus yielding higher patronage and revenues. BART's joint development efforts support regional land-use goals which emphasize the development of existing centers, preservation of open space, and use of transit. Privatization and joint development are also linked to the District's affirmative action program. Specific activities for these programs are called out in the District's objective set as identified on Figures 40 and 41.

PROGRAM AREA OBJECTIVES

Five-year parameters for system operations are summarized in Figure 39. In support of efforts to increase ridership, improve productivity, and expand its financial base, the District will strive to achieve its adopted program area objectives for the upcoming 1987/88 fiscal year. These objectives are presented in Figure 40. Objectives for the four out years in the current five year timeframe are presented in Figure 41.

Figure 39

1987 BART FIVE YEAR PLAN OPERATING PARAMETERS AND FORECASTS

	BUDGETED	FORECAST			
SERVICE DELIVERY	FY 1987/88	FY 1988/89	FY 1989/90	FY 1990/91	FY 1991/92
*Minimum Scheduled Headway (min:sec)	3:45**	3:10	2:30	2:15	2:15
*Peak Period Trains Online	45	48	50	54	54
*Peak Period Cars Online	365	396	400	426	452
Car Hours (1,000's)	1,103	1,151	1,113	1,155	1,208
Car Miles (1,000's)	30,203	31,516	30,499	31,631	33,083
PATRON RESPONSE					
Total Passenger Trips (1,000's)	57,894	60,773	62,731	64,969	67,327
Average Weekday Trips (1,000's)	200	210	217	225	234
Passenger Miles (1,000's)	726,570	762,701	787,274	815,361	844,954
FINANCIAL RESULT					
Total Operating Expense (1,000's)	$173,501	$188,830	$200,866	$212,884	$225,302
System Operating Ratio	49.5%	46.9%	45.3%	44.2%	43.2%
Rail Farebox Ratio	49.9%	47.9%	46.3%	45.1%	44.1%
Rail Cost Per Passenger Mile	21.7¢	22.6¢	23.4¢	24.0¢	24.5¢
MISCELLANEOUS					
District Staffing	2,364.5	2,453.5	2,482.5	2,502.5	2,513.5

*Maximum service level programmed during respective fiscal years.
**Except for 3:00 headway during peak 15 minutes.
***Includes capitalized and other reimbursable positions.

Figure 40

BART OBJECTIVES FOR FY 1987/88

Program Area A: BASIC SYSTEM SERVICE AND CAPACITY

1. Balance capacity where possible such that load factors for peak period trains which can be lengthened or shortened (consists between 3 and 10 cars) are relatively equal but not less than 1.10, and provide offpeak service such that no train load factor exceeds 1.05.

2. Operate weekday peak period Transbay service in the peak direction providing at least 98.0% of scheduled train throughput and 97.5% of scheduled car throughput on a monthly average basis.

3. Make available 106 A-cars and 270 B-cars for revenue service by 4 AM.

Program Area B: RELIABILITY

1. Complete 99% of all scheduled dispatches.

2. Conduct operations such that 95% of daily terminal-to-terminal runs are completed within 5 minutes of scheduled run times with at least 93% during AM and PM peak periods for commute days.

3. Provide service such that no more than 2% of peak period trains experience a primary delay exceeding 7 minutes and no more than 6% experience a delay from any cause exceeding 7 minutes.

4. Conduct operations such that 94% of all patron trips are completed on-time. All patron trips are on-time when trains run not more than 5 minutes late or 60 seconds early.

5. Provide service such that passenger offload rates remain at or below the following: vehicle equipment = 1.00; wayside equipment = 0.08; operations and other = 0.40; and the total = 1.48 (per 1,000 car hours).

6. Maintain the overall AFC technician maintenance incident rate at or below 0.30 incidents per 1,000 passenger trips, and maintain or exceed a 6 AM average weekday availability rate of 95% for entry/exit gates and 90% for ticket vendors.

7. Maintain a 6 AM average weekday availability of 98% for elevators and 95% for escalators.

8. Maintain express bus on-time performance such that 95% of all runs arrive at their final destination within 5 minutes of schedule.

Figure 40(Continued)

BART OBJECTIVES FOR FY 1987/88

Program Area C: SAFETY AND SECURITY

1. Continue to provide an environment for patron circulation through trains and stations such that the accident rate does not exceed 17.7 per million passengers.

2. Reduce the total annual amount of employee lost time due to injuries as a percent of time worked to 0.50% or less.

3. Conduct a minimum of one emergency plan exercise per month involving emergency response agencies.

Program Area D: PATRONAGE AND TRAVEL PROMOTION

1. At a minimum, achieve normal growth projections for average daily patronage as follows (in 1,000's):

	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	FY 87/88
Average Weekday:					
4-hour Peak:					
Offpeak:			(To Be Provided)		
Saturday:					
Sunday:					

2. Continue sampling procedure to evaluate train and station area cleanliness, and maintain train and station cleanliness at or above an evaluation rating of 95% and stations at or above 92%.

3. Continue concern for customer relations among public contact personnel such that the rate of patron complaints about this issue remains below 8.75 per million trips.

4. Maintain at least 150 offsite ticket outlets at banks and other vendors in addition to employer distribution program, with adequate coverage throughout the District.

Figure 40 (Continued)

BART OBJECTIVES FOR FY 1987/88*

Program Area E: FINANCIAL AND OPERATIONAL EFFICIENCY

1. *Maintain a funded budget and farebox ratios of no less than ___% for BART express bus operations, ___% for rail operations, and ___% for systemwide operations.

2. *Maintain a system operating ratio of no less than __%.

3. Maintain a rail cost per passenger mile of ___¢ or less.

4. *Achieve a level of service output such that _____ vehicle miles are produced per equivalent District employee (based on 2,000 hours worked, including overtime and excluding capitalized labor).

5. *Improve system utilization (passenger miles per seat mile) to ___% through continued monitoring of train capacity to match passenger demand patterns.

6. Maintain a paid sick leave rate of no more than 3.5% (9.1 paid days) annually per employee.

7. Transmit key performance reports to the Board of Directors, Department Managers, and/or other recipients within the following number of working days after the close of each reporting period: Monthly Patronage Report (10), Monthly Budget Performance Report and Quarterly Affirmative Action Report (15), Quarterly Financial Statements (25), Quarterly Performance Report on System Objectives (35), Quarterly Operations Performance Report (45), and the Annual Report (75).

8. Reduce the number of District objectives by 25%.

Program Area F: AFFIRMATIVE ACTION

1. *Work to increase the workforce representation of women and minorities into targeted job categories from 22% to __% in accordance with the 1987/91 Affirmative Action Plan.

2. Work to achieve 21% minority business enterprise participation for all District contracts determined to have MBE opportunities, with 18% DBE and 3% WBE participation for federally assisted contracts.

3. Work to achieve not less than 15% equity participation in District Joint Development Projects by women and minority individuals and/or business enterprises.

*All blanks to be determined by adoption of the District budget for FY 1987/88.

Figure 40(Continued)

BART OBJECTIVES FOR FY 1987/88

Program Area G: SYSTEM ACCESS

1. Provide 1,894 BART-owned paved parking spaces at existing rail stations.
2. Acquire funding for Pleasant Hill Station parking structure and initiate engineering design.
3. Advocate achievement of __% of BART/AC bus connections with coordinated schedules. (To be based on discussions with AC Transit).
4. Implement first stage streamlining in the West Corridor.
5. Implement Express Bus/Rail ticket.
6. Complete 75% of Phase II station elevator conversions.
7. Complete platform edge installations at all stations.

Program Area H: JOINT DEVELOPMENT

1. Complete station area plans at Concord and MacArthur Stations, assuming local government cooperation.
2. Initiate station area planning process at Bayfair, El Cerrito del Norte, and El Cerrito Plaza Stations.
3. Assuming favorable market conditions, negotiate an acceptable ground lease agreement at at least one of the above sites.

Program Area I: EXTENSIONS

1. Complete the Fremont-South Bay Corridor Alternatives Analysis/Draft Environmental Impact Report.
2. Complete acquisition of at least three extension sites.
3. Complete the Pittsburg-Antioch Corridor Alternatives Analysis/Draft Environmental Impact Statement/Draft Environmental Impact Report.

Figure 41

BART OBJECTIVES FOR FY 1988/89 THROUGH 1991/92

Program Area A: BASIC SYSTEM SERVICE AND CAPACITY

- Operate 4-route weekday service with the capability of providing sustained 3 minute 10 second-headways by December 1988 following the completion of the Daly City Turnback reducing to 2 minutes 30 seconds by July 1989, and 2 minutes 15 seconds by July 1990 following the completion of remaining capacity expansion projects.

- Support the following weekday car requirements (as of the fourth quarter of each fiscal year):

Service Requirements	1989	1990	1991	1992
A-Cars				
B-Cars				
C-Cars				
TOTAL				
Service Distribution				
On-Line				
Spares		(To Be Provided)		
TOTAL				
Total Fleet				
A-Cars				
B-Cars				
C-Cars				
TOTAL				

Program Area B: RELIABILITY

- At a minimum, maintain current reliability objective level performance under higher density train operations.

Program Area C: SAFETY AND SECURITY

- Maintain current levels of patron and employee safety as measured by the patron accident rate and lost-time injury rate objectives.

Program Area D: PATRONAGE AND TRAVEL PROMOTION

- Maintain acceptable quality of service as reflected by accuracy of service announcements, employee helpfulness, and station cleanliness in support of achieving the following patronage levels (in 1000's):

	FY 88/89	FY 89/90	FY 90/91	FY 91/92
Average Weekday:				
4-Hour Peak:				
Offpeak:		(To Be Provided)		
Saturday:				
Sunday:				

- In addition to FY 1987/88 offsite ticket outlets, increase the number of outlets by 25 each fiscal year.

Figure 41 (Continued)

BART OBJECTIVES FOR FY 1988/89 THROUGH 1991/92

Program Area E: FINANCIAL AND OPERATIONAL EFFICIENCY

- Continue to provide cost-effective and efficient service through the achievement of key financial and operational efficiency objectives.

Program Area F: AFFIRMATIVE ACTION

- Work to increase the workforce representation of women and minorities into targeted job categories from __% by June 1988 to __% by June 1991 in accordance with the 1987-1991 Affirmative Action Plan.

Program Area G: SYSTEM ACCESS

- Complete parking redesign and surface parking projects.
- Complete parking facilities at Pleasant Hill.
- Complete Daly City Intermodal Facility.
- Complete freeway off-ramp bus stops and the Dublin, West Livermore, West Antioch, Antioch, Pittsburg and Hercules Park and Ride lots.
- Implement second stage streamlining in all Express Bus corridors.
- Complete remaining 25% of Phase II station elevator conversions.

Program Area H: JOINT DEVELOPMENT

- Continue station area planning efforts in preparation for marketing specific sites for development.
- Market specific sites as market conditions and local plans permit.

Program Area I: EXTENSIONS

- Continue to implement the Extension Right-of-Way Acquisition Program.
- Complete the Alternatives Analysis and Final Environmental Impact Requirements for Phase I of the BART Extension Staging Policy.

CHAPTER III

FIVE YEAR
OPERATING FINANCIAL PLAN

Given the foregoing identification of specific performance objectives for the five-year period, it is the purpose of this chapter to identify the financial requirements for implementing proposed improvements and service expansion, to highlight problems limiting implementation, and to recommend feasible solutions in the form of a five-year financial plan.

The District's five-year operating budget projections (Figure 42) are based on the tentative FY 1987/88 budget.

FY 1987/88 OPERATING BUDGET

The tentative operating budget for FY 1987/88 has been developed to meet the previously described goals and objectives. Year-to-year comparisons below are in terms of the adopted 86/87 budget. However, because operating revenues and financial assistance are significantly below budgeted FY 86/87 levels, estimated/actual FY 86/87 figures are also shown.

The budget anticipates net fare revenues of $79.5 million with a rail farebox ratio of 49.9%, and other operating revenues of $6.4 million, resulting in an operating ratio of 49.5%.

Property Tax receipts are estimated at $7.6 million, and Sales Tax receipts are forecast at $89.1 million.

Operating Expenses are anticipated to decrease by $1.0 million (0.6) from the FY 1986/87 budget to $173.5 million for the year.

Net labor cost is expected to increase $1.9 million (1.7%). Labor cost is based primarily on contractual wage and salary increases, plus the increased cost of providing existing fringe benefits.

Total nonlabor cost is expected to decrease by $2.9 million (4.8%). The cost of the Express Bus and Shuttle Program is expected to increase by $0.6 million. New initiatives to make this program more financially effective are under study, but are not expected during FY 1987/88. The purchase of feeder service from AC Transit is expected to cost $5.8 million. In accordance with the regional transit financial planning agreement among BART, the two other major transit operators and MTC, feeder service will also be purchased from S. F. MUNI for $1.3 million.

Traction/Station Power cost is expected to be $2.8 million lower than the cost budgeted for FY 1986/87. Other nonlabor expense is expected to decrease by $0.7 million. Expected receipts of financial assistance through MTC of $1.9 million SB 1335 (STA) and $0.3 million TDA funds are budgeted.

As called for in last year's Five Year Plan, certain capital expenditures are also to be funded from operating sources. Capital Allocations totalling $4.7 million are budgeted for Improvement Allowance ($3.1 million) and Planning and Station Area Development ($1.6 million). The Operating Budget will also fund Debt Service Allocations of $12.6 million for the Revenue Bond Debt Service.

Figure 42

1987 FIVE-YEAR OPERATING BUDGET PROJECTIONS
($1,000s)

	Actual 1985/86	Budget 1986/87	Estimated Actual 1986/87	Projected 1987/88	Projected 1988/89	Projected 1989/90	Projected 1990/91	Projected 1991/92
REVENUES								
Net Rail Revenue	$72,134	$83,110	$77,631	$78,591	$82,499	$85,158	$88,196	$91,396
Express Bus Revenue	918	1,099	852	860	911	963	972	982
Net Passenger Revenue	$73,052	$84,210	$78,483	$79,451	$83,410	$86,121	$89,168	$92,378
Interest Earnings	$4,997	$6,240	$5,203	$4,378	$2,922	$2,259	$1,696	$1,442
Other Revenue	4,022	1,591	1,938	1,992	2,225	2,588	3,175	3,450
Other Operating Revenue	$9,019	$7,831	$7,141	$6,370	$5,147	$4,847	$4,871	$4,892
Net Operating Revenues	$82,071	$92,040	$85,624	$85,821	$88,557	$90,968	$94,040	$97,270
EXPENSES								
Net Labor	$106,442	$113,860	$110,024	$115,800	$127,023	$135,340	$143,244	$151,246
Electric Power	19,272	22,100	17,600	19,300	21,276	23,146	24,896	26,815
Other Non-Labor	21,915	23,088	20,121	22,412	24,097	25,478	27,351	29,332
Express Bus	7,579	8,099	8,115	8,554	8,982	9,431	9,903	10,398
BART Shuttles	185	226	232	351	369	387	407	427
Bus Operator Transfer Payments	5,500	7,083	7,083	7,083	7,083	7,083	7,083	7,083
Total Operating Expenses	$160,894	$174,457	$163,175	$173,501	$188,830	$200,866	$212,884	$225,302
OPERATING DEFICIT	($78,823)	($82,416)	($77,551)	($87,680)	($100,274)	($109,898)	($118,844)	($128,032)
FINANCIAL ASSISTANCE								
Property Tax Revenues	$6,757	$6,750	$7,073	$7,639	$8,021	$8,422	$8,843	$9,285
Sales Tax Revenues (BART 75% Share)	84,232	88,856	86,394	89,091	93,545	98,222	103,134	108,290
TDA ('BART Only')	564	548	548	348	366	384	403	423
STA, Other State Funds	1,826	2,399	433	1,911	0	0	0	0
Debt Service Allocations	(11,566)	(13,800)	(13,457)	(12,568)	(14,460)	(14,550)	(14,580)	(14,645)
Capital and Other Allocations	(3,000)	(4,505)	(3,450)	(4,709)	(4,889)	(5,074)	(5,263)	(5,456)
Total Financial Assistance	$78,812	$80,247	$77,541	$81,712	$82,582	$87,404	$92,537	$97,898
NET FINANCIAL RESULT	(11)	(2,169)	(10)	(5,968)	(17,692)	(22,494)	(26,307)	(30,134)
NET OPERATING RESERVE								
Beginning Balance	$5,317	$5,306	$5,306	$5,296	($672)	($18,363)	($40,857)	($67,164)
Ending Balance	$5,306	$3,137	$5,296	($672)	($18,363)	($40,857)	($67,164)	($97,298)
FINANCIAL INDICATORS								
Annual Patronage	58,895	60,423	56,530	57,894	60,773	62,731	64,969	67,327
Annual Passenger Miles	751,848	774,617	709,452	726,570	762,701	787,274	815,361	844,954
Fare Box Ratio: Rail Only	48.86%	52.25%	52.54%	49.90%	47.9%	46.3%	45.1%	44.1%
Fare Box Ratio: Express Bus Service	12.11%	13.57%	10.50%	10.05%	10.1%	10.2%	9.8%	9.4%
Operating Ratio	51.01%	52.76%	52.47%	49.46%	46.9%	45.3%	44.2%	43.2%
Rail Cost Per Passenger Mile	$0.196	$0.205	$0.208	$0.217	$0.226	$0.234	$0.240	$0.245
CAPITAL AND DEBT SERVICE ALLOCATIONS								
Revenue Bond Debt Service	$10,387	$12,600	$12,568	$12,568	$14,460	$14,550	$14,580	$14,645
Sales Tax Anticipation Note Debt Service	1,180	1,200	889	0	0	0	0	0
Improvement Allowance	3,000	3,100	3,100	3,100	3,200	3,300	3,400	3,500
Planning	0	668	350	670	703	738	775	814
Joint Development	0	737	0	939	986	1,036	1,087	1,142
Total Capital and Debt Service Allocations	($14,566)	($18,305)	($16,907)	($17,277)	($19,349)	($19,624)	($19,843)	($20,101)

After these allocations have been budgeted, total operating uses exceed sources by $6.0 million.

ANTICIPATED GROWTH RATES

This section describes the assumptions on which the updated five-year financial plan is based.

Labor is the most significant element of operating costs at 67.2% with all non-labor costs comprising only 32.8% over the next 5-year period. The operating budget plan in Figure 42 includes two components of labor expense, the current base and that which is required for expanded service. The base includes those positions which are needed to maintain current service. Over the five-year period, some new positions will have to be added for this purpose. However, most of the increase in the base reflects the cost of anticipated improvements in wages and benefits as covered by new contracts which are to be negotiated during this five-year cycle. Maintaining current employee benefits over the five-year period and providing the additional positions needed to continue existing service are also included.

Non-labor expense includes two major items, electric power and purchased transportation (express bus, shuttle and feeder service), and a variety of other lesser items.

The forecasting of future power cost increases is subject to a considerable degree of uncertainty given the large number of influencing factors. These include decisions made at the State and Federal levels concerning atomic power plant certification and international political developments which affect the price and/or availability of oil. Another significant factor is the magnitude of rainfall and thus available hydroelectric resources. The power cost associated with providing the current level of service is expected to increase 10% the first year, and 4.5% annually thereafter. Rainfall and fuel price levels together with the availability of electric power from alternate sources will impact future BART power cost estimates. Alternate sources of power are being evaluated and future cost projections may be affected.

It is anticipated that the Express Bus program may be operated by a private firm during the coming five-year period to improve financial effectiveness. At this point, it is not clear what the financial impact will be of such privately provided service.

All other nonlabor expense items are expected to increase by an average of 5.0% annually to maintain current service; actual increases are greater due to the additional service planned.

BART passenger growth was documented above in Figure 13 (see Chapter I). Other operating revenue is expected to be somewhat lower than previously budgeted because of declining interest rates on investment of operating funds and the impact of the new tax laws on tax anticipation notes.

For the upcoming five-year period, BART sources of financial assistance are forecast to grow at somewhat lower rates than last year's plan assumed because of slower than expected economic growth. Sales tax yields are projected to expand by 3.1% in FY 87/88 and 5% each year thereafter, based in part on the projected statewide growth forecast by the Commission on State Finance, as adjusted for historically lower growth in the three BART counties. Property tax revenues are expected to increase by 8% in FY 87/88 and 5% each year thereafter.

Discretionary financial assistance which is allocated to BART by MTC is likewise projected at significantly different levels in this year's Five Year Plan, based on the preliminary allocation estimate furnished earlier this year. This estimate calls for only $1.9 million of STA funds and $0.3 million of TDA funds. For purposes of the current financial plan, TDA funds are expected to grow at the rate indicated above for BART sales tax revenues. Because of continued uncertainty about the continuation of the STA program beyond the one-year extension now being considered by the Legislature, no additional funds are projected from this source beyond FY 87/88.

ADDITIONAL STAFFING REQUIREMENTS

In preparation for the planned increases in service capacity, BART will need to begin expanding its current staffing level to support this change. Most of the increase will occur in the operations departments as the District takes delivery of new revenue vehicles, expands to provide appropriate maintenance, and ultimately puts more cars and trains on line. A few additional positions will be required in administrative and support departments, due to the increased workload produced by increased cash handling volume and new marketing programs.

Figure 43 summarizes new hiring requirements for the five-year period as projected by appropriate departments. The largest increases are in Field Services, Power & Way Maintenance, Finance and Rolling Stock Maintenance. As expected, staffing increases in these departments will be required in anticipation of receipt of the new revenue vehicles and with sufficient lead time for training prior to inauguration of expanded peak period train service.

FIVE-YEAR OPERATING BUDGET PLAN

The five-year operating budget plan is summarized in Figure 42. Actual results for FY 1985/86 and estimated results for FY 86/87 are also shown. Note that financial performance in FY 86/87 is significantly below budget in operating revenue and financial assistance as well as operating expense.

Given the FY 1986/87 financial results, the projected operating deficits for the period FY 1986/87 through FY 1990/91 are cause for concern. In view of the slower than previously estimated growth of operating revenues and financial assistance, future cost containment will take on even greater importance than it has to date.

PROJECTED REQUIREMENTS FOR ADDITIONAL STAFF POSITIONS
FY 1986/87 - FY 1991/92

Department	Budget 86/87	Incremental Positions as of June 30 87/88	88/89	89/90	90/91	91/92	5-Year Increase	Total 91/92
GENERAL MANAGER	5.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0
LEGAL	18.0	0.0	2.0	0.0	0.0	0.0	2.0	20.0
FINANCE	116.0	(6.0)	11.0	1.0	1.0	1.0	8.0	124.0
DISTRICT SECRETARY	4.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0
PLANNING, BUDGET AND RESEARCH	29.0	1.0	0.0	0.0	0.0	0.0	1.0	30.0
PUBLIC AFFAIRS	12.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0
SAFETY	14.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0
EMPLOYEE RELATIONS	58.0	(10.0)	0.0	0.0	0.0	0.0	(10.0)	48.0
AFFIRMATIVE ACTION	8.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
MATL MGMT & PROCUREMENT	67.0	7.0	0.0	0.0	0.0	0.0	7.0	74.0
INFORMATION SYSTEMS	36.0	(1.0)	0.0	0.0	0.0	0.0	(1.0)	35.0
ADMINISTRATIVE SERVICES	32.0	0.0	0.0	0.0	0.0	0.0	0.0	32.0
Total Admin. and Support Services	399.0	(9.0)	13.0	1.0	1.0	1.0	7.0	406.0
MAINTENANCE & ENGINEERING			0.0	0.0	0.0	0.0	0.0	0.0
MAINTENANCE SUPPORT	118.0	(1.0)	2.0	0.0	0.0	0.0	1.0	119.0
COMMUNIC/COMPONENT REPAIR	160.0	(3.0)	0.0	0.0	1.0	2.0	0.0	160.0
ROLLING STOCK MAINTENANCE	316.0	(3.0)	47.0	0.0	0.0	0.0	44.0	360.0
POWER & WAY MAINTENANCE	452.0	13.0	17.0	12.0	10.0	0.0	52.0	504.0
ENGINEERING & CONSTRUCTION	53.0	(1.0)	0.0	0.0	0.0	0.0	(1.0)	52.0
Total Maintenance and Engineering	1,099.0	5.0	66.0	12.0	11.0	2.0	96.0	1,195.0
FIELD SERVICES	24.0	3.0	0.0	0.0	0.0	0.0	3.0	27.0
TRAIN OPERATIONS	311.0	8.0	4.0	3.0	6.0	0.0	21.0	332.0
STATION OPERATIONS	210.5	0.0	3.0	8.0	0.0	3.0	14.0	224.5
POLICE SERVICES	183.0	(8.0)	3.0	5.0	2.0	5.0	7.0	190.0
Total Field Services	728.5	3.0	10.0	16.0	8.0	8.0	45.0	773.5
Total Operations Departments	1,827.5	8.0	76.0	28.0	19.0	10.0	141.0	1,968.5
Total District	2,226.5	(1.0)	89.0	29.0	20.0	11.0	148.0	2,374.5
Cumulative Increase/(Decrease)	--	(1.0)	88.0	117.0	137.0	148.0		

Includes part-time Emergency Procedures Assistants, Train Operators, Station Agents, and Police Cadets at one-half position each.
Does not include capitalized or otherwise reimbursable positions.

According to the projections in Figure 42, annual deficits ranging from $6-30 million are anticipated at current fare levels. Thus, if actual ridership growth and increases in financial assistance do not exceed current projections significantly, there will be a pressing need for revision of the five-year financial plan.

In order for BART to balance its five-year operating budget and minimize the necessity for fare increases, some combination of the following strategies will be necessary:

(1) Stimulate additional demand through more effective marketing, reduced load factors and other service enhancements.

(2) Development of other revenues from fiber optics, telephones, etc.

(3) Reduction of operating expenses through greater improved cost effectiveness in areas such as power costs and express bus, and reductions in support programs.

(4) Deferral of planned service expansion.

(5) Allocation to BART of some portion of the 25% of the 1/2% sales tax revenues administered by MTC if additional local revenues become available to AC Transit and S. F. Muni.

(6) Reduction or elimination of the feeder service purchase requirement if additional local operating support becomes available for AC Transit and S. F. Muni.

(7) Reduction of the amount allocated from BART operating funds for capital purposes.

In this presentation, an estimated year-end result is shown for each year, which represents the District's ending balance in its net operating reserve, or working capital. District financial operations require a working capital balance of $5 million. The revenue bond covenant requires that a reserve be maintained equivalent to 2% of the following year operating budget. As noted, this will be funded from capital reserves as necessary.

The plan assumes that the revenue bond debt service requirements will be funded each year by an allocation from the operating budget. This and other debt service requirements are summarized in Figure 44.

Figure 44

FIVE-YEAR PLAN DEBT SERVICE SUMMARY*
($1,000's)

	FY 86/87#	FY 87/88	FY 88/89	FY 89/90	FY 90/91	FY 91/92
Debt Service Expense						
General Obligation Bond Interest Redemption	54,218	54,737	55,311	55,443	47,189	46,000
SSD #1 Bond Interest and Redemption	735	736	736	735	733	725
Revenue Bond Debt Service	12,568	12,568	14,460	14,550	14,580	14,645
Sales Tax Anticipation Note Debt Service	889	0	0	0	0	
Total Debt Service Requirements	$68,410	$68,041	$70,507	$70,728	$62,502	$61,370
Sources of Funds						
General Obligation Bond Interest and Redemption Fund	54,218	54,737	55,311	55,443	47,189	46,000
SSD #1 Bond Interest and Redemption Fund	735	736	736	735	733	725
Allocation from Operating Budget for Revenue Bond Debt Service	12,568	12,568	14,460	14,550	14,580	14,645
Allocation from Operating Budget for Sales Tax Anticipation Note Debt Service	889	0	0	0	0	
Total Sources of Funds	$68,410	$68,041	$70,507	$70,728	$62,502	$61,370

Actual/estimated

DRAFT

BAY AREA RAPID TRANSIT DISTRICT

1987 FIVE YEAR PLAN

VOLUME II

CAPITAL IMPROVEMENT PROGRAM

APRIL 1, 1987

DRAFT

1987
BAY AREA RAPID TRANSIT DISTRICT
FIVE YEAR PLAN

FOR THE PERIOD JULY 1987 THROUGH JUNE 1992

The preparation of this report has been financed in part through a grant from the United States Department of Transportation, Urban Mass Transportation Administration under the Urban Mass Transportation Act of 1964, as amended, as passed through the Metropolitan Transportation Commission.

The contents of this report reflect the views of BART, which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the original views or policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation.

April 1, 1987

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

BOARD OF DIRECTORS

Margaret K. Pryor
President

Barclay Simpson
Vice President

Robert S. Allen

Nello Bianco

John Glenn

John H. Kirkwood

Arthur J. Shartsis

Arlo H. Smith

Wilfred T. Ussery

Keith Bernard
General Manager

Department of Planning, Budget and Research
Bay Area Rapid Transit District
800 Madison Street
Oakland, California 94607

VOLUME II CAPITAL IMPROVEMENT PROGRAM

TABLE OF CONTENTS

SUMMARY (To be provided)

I. INTRODUCTION
   Focus of Past Plans
   Goals Addressed by This Year's Plan
   Organization of Document

II. PROGRAM DESCRIPTION
   Basic System Requirements Projects
   Capacity Expansion Projects
   Parking Projects
   Extensions

III. FINANCIAL PLAN
   Description
   Cash Flow Projections
   Extension Funding Plan
   BART Reserves Projections

CHAPTER I

INTRODUCTION

This year's Short Range Transit Plan (SRTP) is significantly different from those of the past few years. BART is nearing a turning point in its development. The Capital Improvement Plan (Volume II) of the SRTP has been written as a separate volume to reflect the emphasis of the next few years on funding projects to support full utilization of the valuable asset represented by the basic BART system. This document describes the shift in focus in the capital plan, shows how the group of projects described here supports District goals, and discusses the financial viability of the plan in the final section.

Focus of Past Plans

In the past 5 to 6 years the principle focus of the capital component to the SRTP has been on the Capacity Expansion Program. This is a set of projects aimed at allowing the original BART System to accommodate the maximum achievable capacity. At the same time, projects that supported improved safety, reliability, and maintenance of the existing physical plant were included. Access and extension projects were included, but were secondary to the more important basic system/capacity expansion projects.

Last year (1986) represented a milestone. It was the first year that funding for the Capacity Expansion Program was virtually assured. It also marked the completion of some of the projects in that program. All of the projects in the program are now well underway or complete.

Last year also marked a leveling off of patronage growth. This phenomenon, coupled with a fare increase, lead to an actual drop in ridership. These two events have had an impact on BART and consequently on the capital plan.

This year's plan focuses on four areas. First it continues to emphasize projects that support the continuation of efficient, reliable, safe service on the basic system. Without maintaining the current physical plant, service can deteriorate. Reduced performance could lead to reduced patronage growth.

The second area of emphasis in the plan remains the Capacity Expansion Program. Given that funding is virtually complete, for this set of projects, the plan emphasizes the progress on implementing these projects.

Once the Capacity Expansion Program is complete, BART will become even more access constrained than at present. Parking and access projects will become critical to allowing patrons to take advantage of the improved carrying capacity. Thus, this year's plan contains a section which emphasizes the access program in detail.

As BART moves beyond providing the best possible service on the basic system, demand for extensions of service gain greater importance. Funding for extensions will require significant public and legislative support. This year's plan contains a detailed description of the extension program.

Goals Addressed by This Year's Plan

The goals detailed in Volume I to the SRTP serve as the foundation for the Capital Improvement Program covered here. The goals which are most directly supported by the plan are:

Operate scheduled 4-route weekday service with route headways of 15 minutes or less during peak and midday periods and expand service within feasible, technical, and financial limits including improved peak-hour frequency of service and capacity where needed.

Improve the reliability and performance of the present BART System.

Continue to improve BART system and patron safety and emergency preparedness.

Fund and implement the necessary capital improvements and replacements to the system.

Improve system access by means of a comprehensive program of parking expansion, BART feeder services, transit coordination, and special projects addressing elderly and handicapped mobility.

Develop station area sites for the realization of increased patronage and revenues, and to enhance the communities BART serves.

Extend BART trunk lines within Bay Area travel corridors where feasible and in support of regional land use policies.

Each project in the plan addresses a goal in some way. Many projects address more than one goal. For example, Rail Replacement is a project in the program designed to continue basic service. There are a number of other projects that are necessary for continued safe, reliable service on the basic system. The Capacity Expansion Program allows improved utilization of the existing physical facility. The link between improved access, and extension projects and the specific goals that relate to these programs is no doubt obvious.

Organization of This Document

The remainder of this document is made up of two chapters. The first provides detailed descriptions for the projects in each of the four areas discussed above. The areas are Basic System Projects; Capacity Expansion Projects; Parking Projects; and finally Extensions. The second chapter provides a detailed financial plan for the projects. Cash flows for all projects except extension implementation are provided. Summaries of cash requirements by funding source are provided as well as a projection of BART capital reserves.

CHAPTER II

PROGRAM DESCRIPTION

As discussed in the Introduction, the BART Capital Improvement Program is divided into four areas or subprograms. This section contains material related to the project descriptions, total costs, and in some cases, status and detailed justifications.

Basic System Requirements Projects

The Basic System Requirements are made up of projects that maintain the basic system physical plant, satisfy system safety requirements, and enhance system efficiency. Table 1 is a listing of these projects. The list of projects is shown in order of FMS (Financial Management System) number.

Most of the projects in the table are funded and many are underway. Following the table are project descriptions and justifications. Only projects for which BART is actively seeking funding from outside sources are covered at this level of detail. Descriptions and justifications are also arranged in order of FMS number.

TABLE 1

FMS#	PROJECT	COST X$000
01NK	EMPLOYEE BREAK ROOM-HAYWARD	$42
01SO	CONSOLIDATE COMPONENT REPAIR SHOP	$235
01RB	VEHICLE WASHER- HAYWARD	$45
(01RM,03PH & 05NF)	TRAIN OPERATOR BREAK ROOM MODIFICATIONS	$841
03FK	SECOND POWER TRANSFORMER-EAST PORTAL-BEKELEY HILLS TUNNEL	$259
03FL	BOOSTER FIRE PUMP-WEST PORTAL-BERKELEY HILLS TUNNEL	$153
03PJ	EXPAND TRAIN CONTROL ROOM-CONCORD YARD	$45
03RB	PATRON EXITING MODIFICATIONS-CONCORD STATION	$136
05NJ	EXPAND TRAIN CONTROL ROOM-RICHMOND YARD	$71
09FE	REPLACE PCB TRANSFORMERS AT SAN FRANCISCO VENT	$728
11FG	EMERGENCY AND PATRON STAIRWAY MODIFICATIONS-EMBARCADERO STATION	$387
11JF&	PLAZA ENTRANCE FENCING-16TH & 24TH STREET STATIONS	$80
11U-	DALY CITY INTERMODAL FACILITLY	$1,300
15AZ	WET STANDPIPES & FIRE DEPARTMENT-CONNECTIONS-21 STATIONS	$1,218
15CL	RAIL REPLACEMENT-PHASE V	$439
15CM	SECOND RAIL REPLACEMENT-PHASE I	$281
15EG	PG&E RATE EVALUATION-ALTERNATIVE SOURCES ANALYSIS	$176
15LC&	ESCALATOR REHABILITATION PROGRAM	$6,500
15N-	HANDICAPPED ACCESSIBILITY MODIFICATIONS (PHASE IV)	$420
15NH	TEXTURED PLATFORM EDGE III	$1,343
15NG	SELF OPERATING ELEVATORS-HANDICAPPED	$2,796
17BS	LAKE MERRITT FIFTH FLOOR REFURBISHMENT	$102
17BJ	REMODEL TELEPHONE CENTER	$32
17HF	COPY MACHINE ACQUISITION (2)	$32
20AC	ELIMINATE STATION INTERFACES	$2,400
20HB	STATION BACKUP POWER	$2,034
21EB&	YARD EFFICIENCY MODIFICATIONS	$319
41BU	REINSTALL SIXTH CAPACITOR & MODIFY OLR	$163
45AH	AC/BART/MUNI SUPER PASS	$3,740
45BF	IBM TICKET TRANSPORT RETROFIT	$1,675
45BK	MUNI FAST PASS ANTI-FRAUD MODIFICATIONS	$35
45CK	CUBIC GATE MODIFICATIONS-AC/BART PASS	$670
47BA	NINE VENDORS & EIGHT ADDFARES- SECOND GENERATION	$1,320
79--	REPLACEMENT MAINTENANCE EQUIPMENT	$1,200
(79AC & 79AD)	NEW MANINTENANCE VANS & PICKUPS	$85
79DA	NEW MAINTENANCE HIGH RAILERS	$307
79B-	REPLACE OVERAGE SEDANS & MAINTENANCE VEHICLES	$4,103
79KF	NEW SAFETY EQUIPMENT	$76
79LC	PORTABLE RADIOS	$46
99*05	AERIAL BARRIERS PHASES I & II	$10,738
99*15	SYSTEM SAFETY UPGRADE PHASE III	$5,000
99*50	LAND & LAND RIGHTS	$121
99*51	AGENCY AND UTILITY AGREEMENTS	$1,523
99*52	OTHER COSTS (INSURANCE, BOND AGENTS, ETC.)	$1,870
99*54	OUTSTANDING CLAIMS	$3,996
99*55	PROJECT DEVELOPMENT	$20,000
99*56	PLANNING & STATION AREA DEVELOPMENT	$9,228
99*57	INVENTORY BUILDUP	$23,407
99*59	STATION AREA DEVELOPMENT INFRASTRUCTURE IMPROVEMENTS	$5,306

TABLE 1 (Continued)

FMS#	PROJECT	COST X$000
99*66	IMPROVEMENT ALLOWANCE ALLOCATION	$19,600
99*73	C-CAR START-UP	$2,000
99*75	SYSTEM PERFORMANCE STUDY JUSTIFIED PROJECTS	$10,000
99*77	DALY CITY TURNBACK OVERRUN RESERVE	$80,000
99*79	SAN FRANCISCO MUNI EXTENSION PROJECT	$15,000
	TOTAL	$243,623

TRAIN OPERATOR BREAK ROOM MODIFICATIONS (01RM, 03PH, 05NF)

PROJECT COST:

$841,000

PROJECT DESCRIPTION:

Provide additional locker, restroom, and breakroom facilities at three East Bay Yards.

PROJECT JUSTIFICATION:

All three BART train yards have a transportation building for train operators, transportation supervisors and clerical support staff. This facility provides a combination kitchen/lunchroom with space for vending machines, and table and chairs, separate restrooms and locker rooms for male and female train operators, and office space for administrative personnel. These transportation buildings provide a place for train operators to prepare for shift check in and out, where lunches and breaks are taken and where a variety of administrative matters are handled.

When the BART system was built, there was an estimate made of required capacity for breakrooms. It was based on train run times and the expected number of operators required to operate trains. The original estimates have proved wrong due to several factors. For example, the travel time (from one end of a line to another) has increased since the original design. Work rules require a break between runs which was not originally envisioned. Another example is that the number of train operators required for yard operations is more than originally planned.

Consequently, it takes many more train operators to run current service than was planned even for the original promised high frequency shorter train service. Thus, the train operator break rooms are inadequate for even current operations.

There are approximately 250 train operators at BART. When peak revenue service expands, approximately 30 additional train operators will be required. The transportation facilities are overcrowded with some lockers housed in restrooms. With the addition of 30 train operators, the situation will worsen. Additionally, separate restroom facilities for men and women are required.

This project rehabilitates and expands current transportation buildings for maintaining existing levels of service by providing for adequate restroom and locker capacity for train operators who operate the trains.

PATRON EXITING MODIFICATIONS - CONCORD STATION (03RB)

PROJECT COST:

$136,000

PROJECT DESCRIPTION:

Add an additional stairway at Concord Station to accommodate increases in patronage.

PROJECT JUSTIFICATION:

This project is to add one platform stairway at Concord Station in order to improve station access. Two factors contribute to this access deficiency. First, BART will implement closer headways on all lines resulting from the capacity expansion program which means that passengers will offboard in stations at more frequent intervals. Thus, the project continues system improvements to provide increased capacity. There has been concern regarding the adequate capability for BART stations to handle increased exiting patron loads. Second, business development in the Concord Station area is creating a reverse commute which will require improved station access for the reverse flow of patrons.

In February 1985, a BART staff analysis was conducted to study passenger station access/egress. The study specifically focused on the need for additional station stairways and escalators from platforms to concourse levels. The analysis was based on a criterion requiring that 95% of peak patron loads exit the platform within 2.25 minutes even with one escalator unavailable. The minimum scheduled headway is expected to be 2.25 minutes after the capacity expansion program is complete. It is necessary for one passenger load to exit the platform prior to another train offloading.

The analysis used passenger flow rates for stairs and escalators based on the supposition that all patrons would be going in the same direction and there would be no reverse passenger flow. Patrons attempting to use the stairs against peak passenger flow would reduce the flow rates.

The study identified several stations that would require additional stairwells or escalators. This list was narrowed down further to three stations: Embarcadero, Daly City and Concord. However, after preliminary review and cost estimates were conducted, the Concord project was deemed the most cost-efficient and viable project of the three. The addition of one escalator at Embarcadero was determined not to be cost-efficient. The Daly City project which would add one escalator was delayed until design of the Daly City intermodal facility and an analysis is conducted of that facility's impact on station access/egress.

(The Embarcadero escalator project is not to be confused with the Embarcadero stairway project. The Embarcadero stairway project is safety-related and is based on different criteria.)

Concord is an end-of-the-line station for eastern Contra Costa County and presently experiences high patronage levels. It has a single platform with two escalators and one stairway. Based on current station design and patronage, 500 patrons must exit the platform in order to accommodate another trainload of passengers on the platform. With 2.25-minute headways and with both escalators operating, 610 people can exit the station prior to the next exiting passenger load. However, at 2.25 headways and only one escalator operating, only 380 patrons would be able to exit the station prior to the next exiting trainload. This is 120 passengers below the criterion. Such a situation could cause delays to the system reducing productivity and impacting patrons.

A further complicating factor is the passenger reverse flow that is developing at Concord Station resulting from business development near the station. Increased reverse flow will require adding a stairway.

Concord has experienced an office construction boom in recent years. This construction includes 1,000,000 square feet of office space in the Bank of America complex, 700,000 square feet of office space in the Tishman development, and several other large completed projects. In addition, Concord Station has been targeted by BART for joint development. Planning approvals for joint development at Concord Station are underway. BART is now negotiating a ground lease for a 300-room hotel which would be the first phase of this joint development. Future joint development will include up to 500,000 square feet of office space. This development will result in increased reverse flow ridership.

It is therefore in the best interest of the patron that an additional stairway be constructed. During peak periods, the additional stairway will better accommodate the reverse passenger flow and minimize disruption of the normal patron exiting. This project is one of two access projects proposed for Concord Station. The other project is a parking facility.

EMERGENCY & PATRON STAIRWAY MODS - EMBARCADERO STATION (11FG)

PROJECT COST:

$387,000

PROJECT DESCRIPTION:

Build two 4-foot wide stairways from the platform to the mezzanine (one at each end of the station).

PROJECT JUSTIFICATION:

As a result of the 1979 fire in the Transbay Tube, BART embarked upon a program to improve the fire resistance of the BART vehicle, evaluate evacuation times, and evaluate wayside emergency response equipment. A number of improvements resulted from that effort, as well as several recommendations. In regards to this project, a Gage-Babcock (consultant) study recommended additional exiting facilities for certain BART stations. BART's safety evaluation concluded that exiting from the Embarcadero Station should be improved. This project would provide modification of the Embarcadero Station to bring emergency egress time within the mean for underground stations. As such, it continues the improvements in fire and life safety that were begun following the fire.

Based on an analysis of exit time to exit platforms and stations, Gage-Babcock found that several stations were significantly outside normal exit times. However, Embarcadero Station was the only underground station identified which makes it more critical an issue. Also, adequate exit capability from Embarcadero Station is important because this station provides access and egress to incidents in the transbay tube.

To improve passenger exit times, this project would provide two stairways from the platform to the concourse level. They would be built in the "shafts" presently occupied by hanging artworks at each end of the station. For additional passenger convenience, the stairs would open into the paid area on the concourse level allowing for additional use by patrons during non-emergency times.

HANDICAPPED ACCESSIBILITY MODIFICATIONS (PHASE IV) (15N-)

PROJECT COST:

$420,000

PROJECT DESCRIPTION:

Provide for additional modifications such as communications and safety improvements for the hearing and vision-impaired, removal of station area pedestrian collision hazards for the benefit of the vision-impaired, the provision of barrier-free fare collection mechanisms for patrons in wheelchairs, and small projects such as curb cuts.

PROJECT JUSTIFICATION:

This project provides for additional modifications to make BART more accessible to patrons with various disabilities.

The hearing-impaired community is advocating implementation by BART of an electronic, visual-display information system on-board rail cars for the communication of essential trip-making and safety messages. The lack of such a communication system improperly impedes access to the rail system for the hearing impaired.

The vision-impaired community is likewise advocating implementation of an on-platform audible information system for the communication of essential trip-making and safety messages. It has been alleged that the lack of such audible information impedes access to the rail system.

The vision-impaired community is also advocating a program of station area pedestrian collision hazard removal and mitigation. Such changes could reduce the frequency and severity of accidents by the vision-impaired colliding with obstacles.

The conversion of BART station elevators to patron self-operation will be a significant accessibility improvement for wheelchairs when the station agent is unavailable to operate the elevator. Wheelchair patrons without considerable use of their arms and hands will continue to face difficulties in processing fare cards in the absence of a station agent. BART is evaluating various possibilities for resolving this situation.

While all BART station areas have been equipped with at least a minimal number of curb cuts to serve wheelchair patrons using major pedestrian routes, particular situations are occasionally identified where additional cuts are justified.

STATION BACKUP POWER (20HB)

PROJECT COST:

$2,034,000

PROJECT DESCRIPTION:

Purchase and install equipment and batteries to upgrade the essential power systems in train control rooms.

PROJECT JUSTIFICATION:

Certain BART train control and communications equipment is supplied by essential power systems. These systems provide uninterruptible power during station power outages and isolate the supplied equipment from utility power system transient disturbances. Currently, uninterruptible power systems (UPS) furnish this essential power.

The original installations are now loaded to a point that certain critical equipment is not supplied by uninterruptible power systems. New projects such as ICS, Cable Plant and RADCOM are complete or underway. Some functions which are presently supplied by essential power will be replaced, but total demand will be significantly greater than the existing essential power capacity. Providing additional essential power would improve availability of voice and data communications between central control and field locations. Thus, during periods of loss of power from the local utility, train delays would be minimized.

The scope of this project is to provide for design, furnishing, and installation of equipment and batteries to upgrade the essential power systems in the train control rooms of 31 stations, 3 yards, 3 ventilation structures and 1 portal structure for new and existing systems. The work will be implemented by a furnish and install, competitively bid, contract and cutover assistance by BART maintenance forces.

Upon completion of this project, existing essential power supply equipment would be replaced at all 38 locations with new static-type uninterruptible power supply equipment similar to the existing equipment, but of a larger capacity and existing battery capacities at all locations would be upgraded and increased in size to one and half hour capacity.

Essential power upgrade must be completed before the ICS is used to control revenue operation.

YARD EFFICIENCY MODIFICATIONS (21EB&)

PROJECT COST:

$319,000

PROJECT DESCRIPTION:

Complete installation of Automatic Car Identification (ACI) system in the Concord, Richmond, and Hayward yards.

PROJECT JUSTIFICATION:

The ACI scanning systems and associated hardware/software at BART identify and automatically record the location of individual BART cars throughout the BART system. This project pertains to the incomplete yard portions of the scanning systems.

Subsequent to the installation of the original ACI systems, BART extended some storage tracks and added others in the three storage yards. Cars entering or stored in these added areas are "lost" to the scanning system and consequently not automatically recorded. The current procedure requires otherwise busy personnel to manually track and record the location of cars on the added or extended tracks. This project will permit the installation of additional ACI systems in the yard areas where needed.

Manual input of car locations can lead to errors. Each time a car or group of cars is moved anywhere in the yard, the car location is manually logged by operations personnel in the tower. During busy times (such as morning and evening layups; afternoon buildups; replacement of bad order trains; and repaired cars that are moved from the revenue vehicle shop area to storage tracks), such manual procedures can interfere with mainline operations.

A complete automatic car locating system will be of even greater importance to efficient yard and system operation, with the imminent arrival of the 150 new C-Cars presently under construction. This major expansion of BART's fleet will not only significantly increase the volume of car locating and identifying required, but will also introduce the problems of tracking both an additional type of car. These activity increases may well overburden a manual system, causing service disruptions. Current switching yard operating practice is to use the tracks not covered by automated scanners for storage of inactive cars, thus minimizing manual tracking. Fleet expansion will require use of the presently unscanned trackage for active transit vehicles, increasing manual workload and directly affecting scheduled passenger service.

The ACI scanner system improvement addressed here is also part of a broader plan for capacity expansion. In order for BART's switching towers and indeed, the system as a whole to more effectively utilize the 150 C-Cars currently in production, without expensive staff increases, a number of improvements are currently under study. Paramount among them is the installation of a network of microcomputers, to facilitate communication between towers and terminal zones, and to present consolidated vehicle status, yard inventory, train schedule, crew schedule, overtime and other pertinent information to Rail Operations foreworkers. This system will in turn, depend heavily on complete and accurate ACI scanner coverage of the switching/storage yards to obtain car location and identification information without time-consuming and error-prone manual input.

The capability to recall the car locations from computer memory is invaluable in planning and scheduling preventative maintenance, modifications, etc. at the various maintenance locations. It will further provide a total inventory of BART cars by location.

MAINTENANCE/SERVICE VEHICLES & EQUIPMENT (79--)

PROJECT COST:

$4,093,000

PROJECT DESCRIPTION:

Procure replacement maintenance/service vehicles and equipment.

PROJECT JUSTIFICATION:

1.	Maintenance/Service Vehicles (Remainder of 84/86) (79B-)	$1,427,000
2.	Maintenance Equipment (84/86) (79--)	400,000
3.	Replace Maintenance/Service Vehicles (86/88) (79B-)	1,096,000
4.	Maintenance Equipment (86/88) (79--)	400,000
5.	Replace Maintenance/Service Vehicles (88/89) (79B-)	370,000
6.	Maintenance Equipment (88/90) (79--)	400,000
	TOTAL	$4,093,000

Properly operating maintenance/service vehicles and equipment will provide for passenger comfort (clean vehicles, stations, shelters, etc.) and convenience (properly operating passenger equipment such as fare gate, ticket and change machines, etc.), proper police coverage and ability to respond to emergencies provide for passenger safety.

BART's maintenance equipment gradually becomes worn from age and usage. Eventually it becomes more economical to replace the old equipment rather than repair it. The ongoing equipment replacement program assures that old, worn-out equipment is replaced in a timely manner to minimize overall costs and ensure personnel safety. If this equipment is not replaced, overall costs will increase and maintenance crews will be disrupted by failed equipment.

This maintenance equipment includes such items as electric and pneumatic grinders and hand tools, portable light and power generator sets, light towers, air compressors, electric carts for transporting personnel and material, commercial lawnmowers, ground maintenance equipment, vacuums, floor scrubbers, polishers and various floor maintenance equipment; shop equipment such as jacks, jack stands, saws, drills, engine test equipment, electric and electronic meters, gauges, test instruments and equipment.

BART has a fleet of light-duty highway vehicles to transport personnel and necessary equipment to work sites in the District. In addition, BART police and District personnel use sedans for regular duties. These vehicles are selected for replacement according to a consistent procedure developed by BART staff. Generally, the policy requires that sedans and pickups must be replaced after 70,000 miles and vans and police cars after 90,000 miles. At current usage rates, an average of 40 light-duty vehicles must be replaced each year. On the average, this is equivalent to replacing each vehicle every five years. However, heavily used vehicles are replaced more often while lightly used vehicles are replaced less often.

Heavy-duty maintenance vehicles also need periodic replacement. Maintenance personnel use these vehicles, which include diesel trucks, tractors, and track-maintenance vehicles, to repair and maintain BART's physical plant and to respond to emergencies. These vehicles' costs and useful lives vary widely.

Annual replacement needs and costs vary accordingly. The ongoing vehicle replacement program assures that all support vehicles are replaced in a cost-effective manner. Without this program, continued use of overage vehicles would increase maintenance and other costs, as well as safety-hazards to personnel.

NEW MAINTENANCE/SERVICE VEHICLES - NEW HI-RAILERS 86/87 (79DA)

PROJECT COST:

$307,000

PROJECT DESCRIPTION:

Procure one fully-equipped hi-rail crew truck, one tunnel truck to support the tamper/liner crew and grout torquing operations and a high rail vehicle to support maintenance of electrical systems in meeting the increased maintenance demands of the Capacity Expansion Program.

PROJECT JUSTIFICATION:

The increase in BART service, resulting in additional transit vehicles and additional trains running at closer headways will have an impact on present track structure maintenance programs and repair. To insure that the level of maintenance exceeds the Federal Railway Administration requirements, the track maintenance cycles relating to surfacing, lining and tamping have to be modified, calling for additional manpower and equipment.

Passenger comfort and safety are related to adequate maintenance of trackbeds, structures and electrical systems. Inadequate maintenance of the trackbed will adversely affect the way rail wears. This could increase rail grinding requirements and ultimately shorten the life of the rail. As the rail wears, a rougher ride is created for passengers and the risk of derailments increase.

In addition to passenger comfort, if track and structures are not maintained properly, they can deteriorate to the place where the only alternative is complete replacement. Beyond this long term inefficiency resulting from inadequate maintenance, higher frequency revenue service will mean a shorter time period during which track and structures can be maintained. This is because there are likely to be increased requirements for yard moves and other activities after revenue hours. The addition of this equipment will allow improved crew scheduling and a more efficient operation over what would otherwise be possible.

The project involves purchase of a hi-rail crew truck, complete with crewcab, to transport personnel, 120 CFM air compressor, 10KW generator set and tool and equipment storage compartments ($80,000).

The increase in service as stated above holds true for structure maintenance as related to the transbay tube, tunnels, and all underground track areas. The frequency of maintenance related to water control, washing, corrosion, bolt torquing, and caulking the steel-liner plates will have to be modified.

To meet these goals an additional hi-rail truck, especially designed for tunnel maintenance will be required. This unit will be complete with an elevating work platform, 120 CFM air compressor, 10KW generator set and crew cab for transporting personnel ($152,000).

The increase in BART service, resulting in additional transit vehicles and additional trains running at closer headways will have an impact on present electrical power system maintenance. The recent expansion of the KE Line, the present expansion at Daly City and the electrification upgrade on the "C" Line, all result in additional equipment, i.e., substations gap breaker station, third rail and third rail coverboard that requires cycled maintenance and repairs.

To meet District maintenance goals, additional manpower and equipment will be required. A third hi-rail truck complete with elevated platform and service body for transporting specialized tools and materials will be essential ($75,000).

AERIAL SOUND BARRIERS - ALBANY ELEVATED TRACK (99*05)

PROJECT COST:

$10,738,000

PROJECT DESCRIPTION:

Provide sound barriers on the section of BART elevated track that passes through Albany.

PROJECT JUSTIFICATION:

Residents along elevated track in Albany have complained of sound from BART. A lawsuit has been filed to get BART to install measures to reduce the sound. This project would allow that installation.

SYSTEM SAFETY UPGRADE (99*15)

PROJECT COST:

$5,000,000

PROJECT DESCRIPTION:

To include any further major wayside improvements that may be ordered by the CPUC as a result of their Investigation OII 85-02-007. These projects may include GBA recommendations previously rejected by BART staff or additional recommendations of the CPUC staff or Fire Dept. Liaison Committee.

PROJECT JUSTIFICATION:

In 1980, BART retained Gage-Babcock Associates (GBA) to study existing emergency wayside facilities. The District is in the process of implementing a number of these projects individually identified in the Project Status Report. In February 1985, the State Public Utilities Commission instituted OII 85-02-007, one aspect of which is to determine if BART should be ordered to implement additional wayside modifications. As a result of their investigation, the Commission could order BART to proceed with some additional modifications. The cost may exceed $5,000,000 depending on the action of the CPUC.

This project will continue the Fire Safety Modifications begun in CA-03-0220 Misc. Fire Safety Grant.

Capacity Expansion Projects

Overview

Provision for full capacity is a major focus of District efforts. The most recent capacity addition occurred in November, 1986 with the addition of 2 peak period trains, bringing total on-line trains to 45. The last major capacity expansion program prior to 1986 was the phasing of close headways service during the summer of 1980, from 3-route to 4-route Transbay service (with the addition of the Richmond/Daly City route). This improvement increased peak period on-line trains from 33 to 42, and on-line cars from 272 to 310. While scheduled peak hour Transbay capacity is 55% greater today, the growth in demand since 1980 has nearly used up this increase in capacity. Constrained ridership levels are clearly part of BART's future unless capacity can be expanded yet again. The following projects are all designed to expand BART capacity such that the ultimate goal of 2 minute 15 second headways can be achieved to provide 54 peak period on-line trains by 1990.

Vehicle Fire Hardening

As a result of the January 1979 Transbay Tube Fire and subsequent investigation, BART is restricted by a California Public Utilities Commission order to operate no more than one train between any two subway air vents per direction at any given time. Widely spaced vents effectively limit headways. This is a precautionary measure imposed to minimize the risk of smoke from a train being drawn past other trains. Vehicle wall and ceiling liners and floors have been reconstructed to reduce flammability and toxic smoke emissions. Removal of vent separation is contingent upon completion of the fire hardening program.

The Vehicle Fire Hardening project was successfully completed in August 1986. The removal of the vent separation restriction is now being pursued.

Project cost: $20.82 million (fully funded and complete)

Subway Vent Train Separation

Due to restrictions resulting from the 1979 Transbay Tube Fire, BART can operate no more than one train between any two subway air vents per direction.

Vehicle Fire Hardening, a prerequisite to eliminating the separation restriction, is now complete. Engineering design for the multiplex speed code equipment (MUX boxes) and the software revision for the Sequential Occupancy Release (SORS) computer is complete. BART is waiting for final PUC approval to remove this operating restriction.

Project cost: $0.47 million (fully funded; scheduled completion: October 1987).

Integrated Control System - ICS

The central train computer, in conjunction with various supporting wayside equipment, provides systemwide train supervision. The existing central computer is capable of monitoring the movement of up to 49 trains at any one time. Expansion of the central control capabilities is needed to allow for on-line train operations exceeding the current 49 train limit. The Integrated Control System (ICS) will allow BART to operate 75 on-line trains initially, with the capability of expanding the control system for operating 115 trains.

Stage II was completed in late 1986. On the basis of maintainability, system simplification, reliability, and cost, the system's configuration was changed. This change was effective in eliminating the station processors (PIO's).

Stage III has commenced and will result in a detailed project plan and schedule for the remainder of the project.

The remainder of the project is composed of 4 more stages, each approximately 6 months in duration. Estimated completion date for the project is October 1989.

Project cost: $31.86 million (fully funded)

Daly City Turnback and Yard

Higher density train operations will require a more efficient and less time consuming train reversing facility at Daly City. An interim measure already completed permits the reduction of the minimum scheduled headway to 3 minutes 30 seconds through train control modifications in the vicinity of Daly City Station.

A West Bay storage facility will be needed to lay up vehicles not needed for midday operations. Layups at this yard will produce significant savings in power and vehicle maintenance costs. Shop facilities would provide essential support to the new yard and in maintaining lower headways. (The Shop Facilities project is a separate project which will cost $7.9 million, of which 39% is currently funded.)

The civil/structural contract for the turnback is 98% complete. The track and contact rail installation and the traction power installation contracts have been awarded. Final cutover plan for M-93 has been reviewed and a draft cutover plan for M-87 has been received from Westinghouse. Final design and engineering review for train control installation is complete. Notice to proceed was given for the yard civil and structure contract and excavation has started. The yard control design and installation contract has been awarded.

Project cost: $149.8 million (fully funded)

Electrical Capacity Increase

Operation of increased numbers of peak period trains at reduced headways will require additional power distribution facilities on the C-line and in all three

East Bay yards. Improvements planned involve the installation of 2 new substations, modification and upgrade of existing yard substations, third rail modifications and increase of yard feeder cable capacity.

The third rail upgrade contract is in progress. Installation demonstration was successful and mainline work has started. Bids for the substation equipment were received and rejected. Bids were received for the yard feeder installation contract, award authorization was granted by the BART board in December 1986, and the contract was signed in February 1987. The substation equipment installation contract is on hold until the equipment is in production.

Project cost: $7.79 million (fully funded)

C-Cars

One hundred fifty new revenue vehicles are needed to service anticipated patronage growth. The new C-cars will permit expansion of existing trains which are less than 10 cars long, addition of new trains on the system (after headways are reduced), and efficient on-line sizing of trains.

The first four prototype cars were delivered in October, 1985. Testing of the prototype cars will end March 31, 1987. Various problems have been found and are being corrected, including the auxiliary power supply equipment. Most of the Production Baseline Design Reviews have been completed. These reviews are necessary before final production of vehicles can occur. First Article Configuration Identification (FACI), to ensure that configuration of the production equipment is in accordance with approved drawings, is continuing. FACI is a necessary quality assurance step required before the vehicles are delivered. Delivery of production cars is expected starting the summer of 1987 with revenue operation beginning October, 1987. The cars are being built by Soferval, Inc. of France. Final assembly is being done in the Soferval plant in Union City, California.

Project cost: $238.19 million (fully funded)

New On-Board ATC

The existing Automatic Train Control (ATC) units on all A-cars represent the largest single cause of vehicle service disrupting failures on the system. The New On-Board ATC will substantially reduce ATC hardware failures and, through the use of redundancy, will reduce ATC-caused service disrupting failures by a factor of 25 to 1. These units will be installed in all new C-cars and will be retrofitted into existing A-cars.

Prototype testing continued in conjunction with C-car testing. Bids are being received on the contract to procure A-car ATO replacement car sets.

Project cost: $13.8 million (fully funded)

M-87 Interlocking

As presently configured, the M-87 interlocking (which provides safe routing of trains in the vicinity of Daly City Station where the tracks cross over each other) creates interference between inbound and outbound trains. Reconfiguring the M-87 interlocking will increase operational flexibility in the vicinity of the Daly City Turnback.

Preliminary Design Review is complete and detailed subsystem design is progressing.

Project cost: (included in the $149.8 million project cost for the Daly City Turnback and Yard project)

Wayside Train Control/System Performance Modifications

The System Performance Study determined that a number of improvements will be necessary, in addition to the projects described above, to achieve BART's capacity expansion objectives while maintaining or enhancing service quality. The improvements necessary include the following key tasks:

- Reconfiguration of track circuits by moving and adding blocks to minimize headways and to match SORS requirements
- Resignalling of some parts of the system (mostly the San Francisco M-line)
- Installation of station approach markers
- Modification of SORS software to reduce time to initialize (reset) the system and to match track modifications
- Optimization of speed codes systemwide
- Development & Implementation of a delay reduction program
- Development of the simulator to include the delay model
- Modification of the Brake Rate Algorithm

The wayside and station multiplex box simulators for the reconfiguration project are in the design and fabrication stage. The design work is continuing and the contract documents are being prepared. The simulator project continues with the development work for ICS testing and refinement of C-car scheduling to accommodate desired train sizing.

Project cost: $14.93 million (46% funded)

Parking Projects

A key element for the success of the Capacity Expansion Program is improved station access. The following discussion covers key issues affecting patron parking and access. Also included is a table listing all of BART's parking projects. To complete this section are project justifications for each parking project submitted to the Metropolitan Transportation Commission for inclusion in the 1988-1992 capital priorities.

BART has exceeded its station parking lot capacity for some time. The parking spillover onto local streets has caused a secondary problem which has led to restricted street parking programs in some communities surrounding BART stations. In addition to the patron and community inconvenience caused by parking shortages, losses in revenues is another concern associated with this problem.

The total cost for the parking program is $185 million. A summary of the program is shown in Table 2. The BART parking program is partially funded with the proceeds of the 1985 Sales Tax Revenue Bond Issue for a total of $60.6 million. The projects that are funded from the "Bond List" are primarily surface parking lots and park/ride lots. The park/ride lots are located on future BART station sites. Only one parking structure is funded from the bond list and that is at Pleasant Hill Station. Several parking projects on the bond list are programmed with a combination of bond funds, state and federal funds.

The $122.1 million unfunded parking program is primarily made up of eleven station parking facilities projects. Five of these projects have been included in the 1987 MTC capital priorities for possible funding in FY 1991/92. Table 3 is a summary of the critical access characteristics at each of these five stations. The data in the table is based on previous work contained in BART Access Plans (Phases I thru IV) with updated data added where available.

From the Table it can be seen that all of the stations experience significant revenue losses due to accessibility constraints. Revenue losses will be more acute after completion of the Capacity Expansion Program. In all, some $4 million annually in lost revenue is projected if the proposed facilities are not built.

Each of the existing stations' lots are filled to capacity early during the morning commute. Subsequently, a number of patrons park on neighborhood streets creating significant neighborhood parking instrusion. Such intrusion results in inconvenience to patrons and lost ridership. Perhaps as significant, it also creates problems for local jurisdictions, businesses and residents in the area of BART stations. Existing parking shortages also limit midday station access. The net result is a degradation in patronage and station area access.

The Table also shows the projected parking shortage at each of the stations. The shortage estimate is based on a ridership/revenue study from 1983 and is consistent with capacity projections for the Capacity Expansion Program.

Further, AC Transit is planning a major restructuring of routes which will have the effect of bringing more buses to BART stations for simultaneous off-loading and boarding. Station transfer facilities are currently inadequate to meet these increased needs.

There are three additional common factors which contribute to the decision to choose five stations for funding consideration. First, each of the stations has the characteristic of being an automobile destination for a larger than normal area around the station. The patron pattern of driving to an end line station and taking BART is well known and documented. The two exceptions are the Fruitvale and Oakland West stations which have a significant number of transbay commute transfers and consequently a similar trip-end characteristic. Second, in the past year BART received critical input from service area patrons and potential patrons through surveys and opinion polls indicating very high demands for additional parking at existing stations. (See Table 4). Third, each of the stations has a positive joint development potential which will be strengthened by improved access facilities.

BART access goals call for parking improvements along with numerous transit oriented improvements, including express and feeder bus services, transit coordination, and elderly/handicapped access improvements. Each of the high priority projects will contain components which address those goals and foster the development of regional intermodal transfer stations.

Finally, each project contains a significant replacement and rehabilitation element. The proposed parking structures will replace existing patron parking on neighborhood streets, plus on-site spaces needed for parking structure and transit interface construction. At most of the stations, additional spaces are being added in response to projected parking shortages and taxpayer demands. Where possible, BART will coordinate construction of parking facilities and transit improvements with the need to maintain, repair, and rehabilitate existing parking lots.

In conclusion, the five high priority projects presented for inclusion in the MTC Program represent a balanced approach to access. They will significantly improve utilization of future capacity anticipated with the BART Capacity Expansion Program and improve existing parking and transit coordination problems. In addition to the five high priority projects submitted for FY 1991/92, BART has submitted four other parking projects for programming in FY 1990/91. BART does not expect to see these parking projects funded due to continuing cutbacks in federal funds. Also, some projects in the Section 3 program are not expected to be funded and will return to the Section 9 program displacing projects curently programmed. These four projects include: Lake Merritt, Bay Fair, Orinda, Lafayette, and MacArthur.

TABLE 2

BART PARKING PROGRAM
X$000

FMS#	PROJECT	FUNDED	UNFUNDED	TOTAL
0--&	PARKING PRODUCTIVITY IMPROVEMENTS*	$5,035	$0	$5,035
01EE	LAKE MERRITT STATION ACCESS IMPROVEMENTS	$0	$6,485	$6,485
01GG	ALAMEDA PARK/RIDE	$429	$0	$429
01GH	FRUITVALE STATION ACCESS IMPROVEMENTS	$0	$10,582	$10,582
01MH	BAYFAIR STATION ACCESS IMPROVEMENTS	$0	$10,809	$10,809
010-	HAYWARD SURFACE LOT EXPANSION	$2,574	$0	$2,574
01VG	UNION CITY SURFACE LOT EXPANSION	$4,073	$0	$4,073
03HG	ORINDA STATION ACCESS IMPROVEMENTS	$0	$9,023	$9,023
03JE	LAFAYETTE SURFACE LOT EXPANSION	$521	$0	$521
03JG	LAFAYETTE STATION ACCESS IMPROVEMENTS	$0	$10,654	$10,654
03LG	WALNUT CREEK STATION ACCESS IMPROVEMENTS	$0	$14,305	$14,305
03NE	PLEASANT HILL PARKING FACILITY- EXPAND*	$2,134	$10,738	$12,872
03NG	PLEASANT HILL PARKING FACILITY- REPLACE.	$20,553	$0	$20,553
03SG	CONCORD SURFACE LOT EXPANSION	$528	$0	$528
03SH	CONCORD STATION ACCESS IMPROVEMENTS	$0	$13,808	$13,808
04IA	RAILROAD AVENUE PARK/RIDE	$130	$519	$649
04KA	SOMERSVILLE ROAD PARK/RIDE	$1,320	$2,125	$3,445
04RA	BRENTWOOD PARK/RIDE	$290	$160	$450
05GB	NORTH BERKELEY SURFACE LOT EXPANSION	$544	$0	$544
05KD	E.C. DEL NORTE SURFACE LOT EXPANSION	$2,121	$0	$2,121
05KH	E.C. DEL NORTE STATION ACCESS IMPROVEMENTS	$0	$12,532	$12,532
05MD	RICHMOND LOT COMPLETION	$100	$0	$100
06KA&	HERCULES PARK/RIDE	$3,471	$0	$3,471
07GH	MACARTHUR STATION ACCESS IMPROVEMENTS	$0	$12,140	$12,140
08GA	DUBLIN PARK/RIDE	$14,935	$0	$14,935
11ED	OAKLAND WEST SURFACE LOT EXPANSION	$89	$0	$89
11EH	OAKLAND WEST STATION ACCESS IMPROVEMENTS	$4,000	$8,177	$12,177
	TOTAL	$62,847	$122,057	$184,904

*FUNDED AMOUNTS 100% BOND FUNDED EXCEPT:
1) PLEASANT HILL PARKING FACILITY-$934K BOND FUNDS
2) PARKING PRODUCTIVITY IMPROVEMENTS-$4.67 MILLION BOND FUNDS

Table 3

Summary of BART Parking Project Proposed for UMTA Section 9 Funding in FY 91/92

STATION	BART FMS#	STRUCTURE PARKING SPACES	FACILITIES COST (Million)	ANNUAL LOST REVENUE (1986 Est.)	TIME LOTS FILL-A.M. (BART Police)	NEIGHBORHOOD PARKING INTRUSION (1986 Est.)	'88 PARKING SHORTAGE	JOINT DEVELOPMENT
Fruitvale	(01GH)	859	$10.6	$700,000	7:00	150 vehicles	1050 vehicles	Possible
Walnut Creek	(03LG)	1,265	$14.3	$925,000	6:30	650	1080	Desirable
Concord	(03SH)	1,385	$13.8	$1,993,000	7:00	370	2200	Yes (Hotel)
El Cerrito del Norte	(05KH)	1,164	$12.5	$733,000	7:30	400	1115	Possible
Oakland West	(11EH)	1,022	$12.1	$1,670,000	7:00	600	2430	Long Term

Table 4

Contra Costa County Opinion Poll

Survey Question: "Need to provide additional parking at the existing BART stations."

County Area	Percent who Favor
West County	60%
Lamorinda	68%
South County	82%
East County	60%
Central County	78%

Source: Contra Costa Sales Tax Study Public Opinion Poll results account for registered voters in the County of Contra Costa, April 1986.

Bay Area Council Survey

In the fall of 1986, the Bay Area Council staff conducted a telephone survey of 31 large Bay Area employers. Although the Council did not claim that this survey was comprehensive, the Council staff believed it to be a reasonable representation. In this survey, twelve employers identified increased BART parking as the public infrastructure investment that would most improve transportation for their respective companies and employees.

LAKE MERRITT STATION ACCESS IMPROVEMENTS (01EE)

PROJECT COST:

$6,485,000

PROJECT DESCRIPTION:

Bus transit interface improvements and approximately 500 parking spaces in a multi-level structure on BART-owned land, including about 100 site replacement spaces.

PROJECT JUSTIFICATION:

All 190 currently available BART parking spaces are filled by 7:30 a.m., limiting midday station accessibility when rail capacity is available. Potential net revenue lost due to this inaccessibility is $128,000 per year. Loss of revenue potential will increase upon completion of BART's capacity increase program, as rail capacity will become available during peak as well as off-peak periods.

Over 100 patron cars parked on nearby streets in 1983, displacing parking for local residents and businesses. The BART patron parking shortage projected for 1988 is 360 spaces.

Additional parking will be necessary to optimize rail efficiency even if the access mode shares supplied by bus transit and carpools remains constant or even increases. Recent experience and projected patronage growth indicates substantially higher absolute numbers of patrons arriving at the station by all modes, including autos.

BART anticipates that most of the autos attracted to new parking will be drawn from regional commuters now utilizing freeways and other congested arteries for their entire commute, and not from current BART patrons now using buses or other access modes. This parking project would therefore remove the major portion of each of these regional trips from the highways, including some of the most severely congested segments in the Bay Area.

Finally, additional parking would allow BART to provide more parking for handicapped patrons and carpools.

FRUITVALE STATION ACCESS IMPROVEMENTS (01GH)

PROJECT COST:

$10,582,000

PROJECT DESCRIPTION:

Bus transit interface improvements and approximately 860 parking spaces in a multi-level structure on BART-owned land, including about 300 site replacement spaces.

PROJECT JUSTIFICATION:

BART system access is a continuation of the Capacity Expansion Program, a multi-year project given high priority by UMTA, the State and BART. Developing adequate station access facilities will be essential to maximize the productivity of other elements of the Capacity Expansion Program.

Existing bus service to the Fruitvale Station is limited to five AC Transit routes. Preliminary discussions with AC Transit indicate that this station may become a transit center allowing for timed transfers and a need to accommodate approximately twelve buses simultaneously. This program concept is consistent with the proposed project design.

Transit coordination improvements will include sheltered walkways and waiting areas for transit passengers; improved signage and transit information; adequate bus bays for twelve or more simultaneous off-loadings and boardings; and fast, safe access for these buses. This project will provide more convenient and attractive regional transit options for existing and future BART patrons.

The multi-level parking structure will be designed to provide approximately 860 patron parking spaces within close proximity to the station entrance, and to expand the number of arriving carpool and handicap spaces.

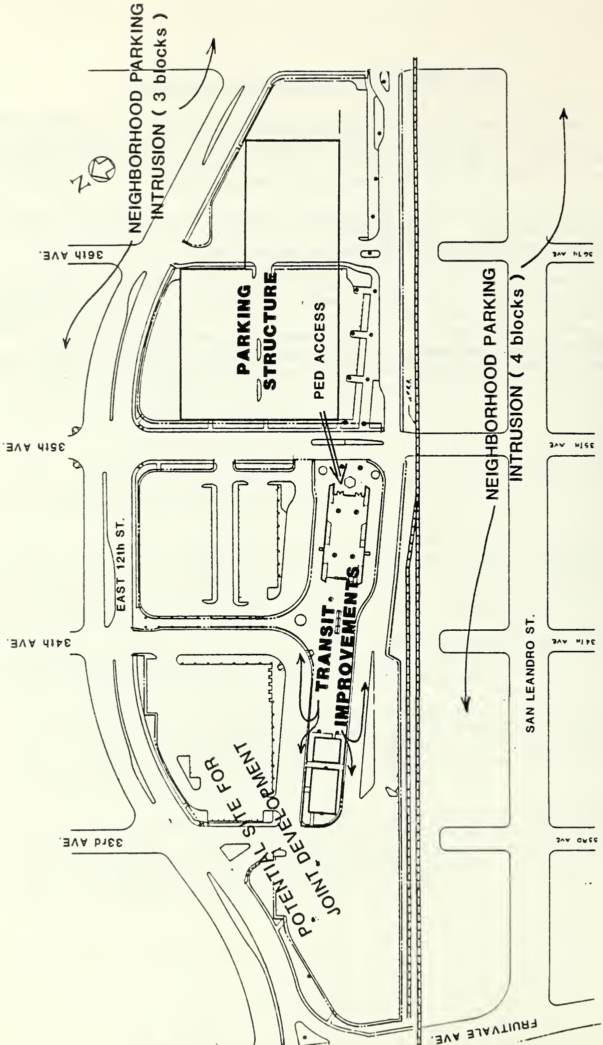
Currently all 790 available BART-provided parking spaces are filled by 7:00 a.m. Consequently it is estimated that over 150 patron cars are parked on nearby streets, displacing parking for local residents and business. The existing parking shortage severely limits midday station access, when ample rail patron capacity is available.

BART patron parking shortage at Fruitvale Station is projected to be 1050 vehicles in 1988. The problem may be accentuated by possible city-enforced station area parking restrictions and ongoing capacity improvements anticipated with implementation of the Capacity Expansion Program. This project responds directly to demands for more on-site station parking.

New parking and transit facilities at Fruitvale Station will improve station access and help BART achieve future patronage projections. The estimated net lost revenue due to access constraints based on the current fare structure, is $700,000 annually for this station. Loss of revenue potential will increase further upon completion of the Capacity Expansion Program.

Fruitvale Station has joint development potential which could be enhanced by the proposed project. That potential could result in long term benefits to patronage, land values and land uses in the station area.

The proposed project will replace approximately 150 off-site patron parking spaces, about 300 on-site spaces needed for parking structure construction, and numerous spaces required for the intermodal transit facilities. Furthermore, parking lot repairs and maintenance are scheduled at the Fruitvale Station in the coming years. If those repairs were coordinated with construction of parking and transit improvements, cost savings could be realized.



FRUITVALE STATION

BAYFAIR STATION ACCESS IMPROVEMENTS (01MH)

PROJECT COST:

$10,809,000

PROJECT DESCRIPTION:

Bus transit interface improvements and approximately 850 parking spaces in a multi-level structure on BART-owned land, including about 250 site replacement spaces.

PROJECT JUSTIFICATION:

All 1,500 currently available BART parking spaces are filled by 7:30 a.m., limiting midday station accessibility when rail capacity is available. Potential net revenue lost due to this inaccessibility is $327,000 per year. Loss of revenue potential will increase upon completion of BART's capacity increase program, as rail capacity will become available during peak as well as off-peak periods.

Over 30 patron cars parked on nearby streets in 1983, displacing parking for local residents and businesses. The BART patron parking shortage projected for 1988 is 810 spaces.

Additional parking will be necessary to optimize rail efficiency even if the access mode shares supplied by bus transit and carpools remains constant or even increases. Recent experience and projected patronage growth indicates substantially higher absolute numbers of patrons arriving at the station by all modes, including autos.

BART anticipates that most of the autos attracted to new parking will be drawn from regional commuters now utilizing freeways and other congested arteries for their entire commute, and not from current BART patrons now using buses or other access modes. This parking project would therefore remove the major portion of each of these regional trips from the highways, including some of the most severely congested segments in the Bay Area.

Finally, additional parking would allow BART to provide more parking for handicapped patrons and carpools.

LAFAYETTE STATION ACCESS IMPROVEMENTS (03JG)

PROJECT COST:

$10,654,000

PROJECT DESCRIPTION:

Bus transit interface improvements and approximately 900 parking spaces in a multi-level structure on BART-owned land, including about 200 site replacement spaces.

PROJECT JUSTIFICATION:

All 1,100 currently available BART parking spaces are filled by 7:30 a.m., limiting midday station accessibility when rail capacity is available. Potential net revenue lost due to this inaccessibility is $264,000 per year. Loss of revenue potential will increase upon completion of BART's capacity increase program, as rail capacity will become available during peak as well as off-peak periods.

Over 150 patron cars parked on nearby streets in 1983, displacing parking for local residents and businesses. The BART patron parking shortage projected for 1988 is 555 spaces.

Additional parking will be necessary to optimize rail efficiency even if the access mode shares supplied by bus transit and carpools remains constant or even increases. Recent experience and projected patronage growth indicates substantially higher absolute numbers of patrons arriving at the station by all modes, including autos.

BART anticipates that most of the autos attracted to new parking will be drawn from regional commuters now utilizing freeways and other congested arteries for their entire commute, and not from current BART patrons now using buses or other access modes. This parking project would therefore remove the major portion of each of these regional trips from the highways, including some of the most severely congested segments in the Bay Area.

Finally, additional parking would allow BART to provide more parking for handicapped patrons and carpools.

WALNUT CREEK STATION ACCESS IMPROVEMENTS (03LG)

PROJECT COST:

$14,305,000

PROJECT DESCRIPTION:

Bus transit interface improvements and approximately 1250 parking spaces in a multi-level structure on BART-owned land, including about 130 site replacement spaces.

PROJECT JUSTIFICATION:

BART system access is a continuation of the Capacity Expansion Program; a multi-year project given high priority by UMTA, the State and BART. Developing adequate station access facilities will be essential to maximize the productivity of other elements of the Capacity Expansion Program.

Existing bus service at Walnut Creek Station includes seven CCCTA scheduled routes, one BART Express Bus route, one CCCTA downtown shuttle bus and numerous private shuttle services. Preliminary discussions with CCCTA indicates that future service needs may more than double the number of simultaneous bus loadings. This program concept is consistent with the proposed project design.

Transit coordination improvements will be designed to include sheltered walkways and waiting areas for transit passengers; improved signage and transit information; adequate bus bays for an increased number of an increased number of simultaneous off-loadings and boardings; and fast, safe access for these buses This project would provide more convenient and attractive regional transit options for existing and future BART patrons.

The multi-level parking structure will be designed to provide approximately 1250 patron parking spaces within close proximity to the station entrance, and to expand the number of arriving carpool and handicap spaces.

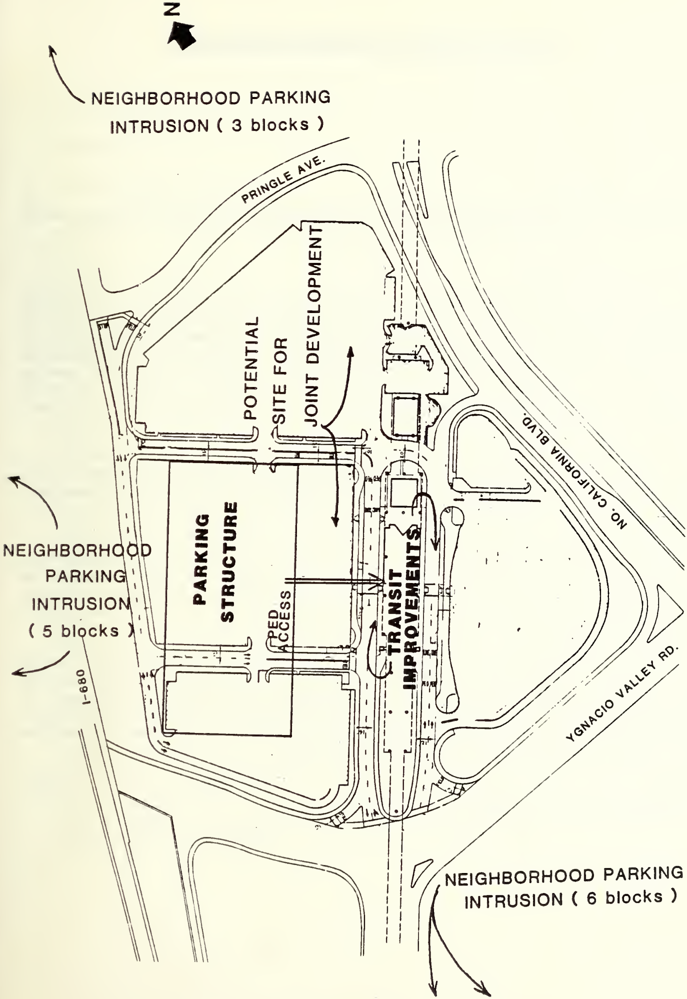
Currently all 1263 available BART-provided parking spaces are filled by 6:30 a.m. Consequently it is estimated that over 650 patron cars are parked on nearby streets, displacing parking for local residents and business. The existing parking shortage severely limits midday station access.

BART patron parking shortage at the Walnut Creek Station is projected to be 1080 vehicles in 1988. The problem will be accentuated by implementation of the Capacity Expansion Program. This project responds directly to demands for more station parking.

New parking and transit facilities at Walnut Creek Station will improve station access and help BART achieve future patronage projections. The estimated net lost revenue due to the projected parking shortage and based on the current fare structure is $925,000 annually for this station. Loss of revenue potential will increase further upon completion of the Capacity Expansion Program.

Walnut Creek Station has joint development potential which could be enhanced by the proposed project. That potential could result in long term benefits to patronage, land values and land uses in the station area.

The proposed project will replace approximately 650 off-site patron parking spaces, about 130 on-site spaces needed for parking structure construction, and numerous spaces required for the intermodal transit facilities. In the coming years Walnut Creek Station parking lots will require additional repairs and maintenance. If those repairs were coordinated with construction of parking and transit improvements, cost savings could be realized.



WALNUT CREEK STATION

PLEASANT HILL STATION PARKING FACILITY (03NE)

PROJECT COST:

$12,872,000

PROJECT DESCRIPTION:

Approximately 1200 parking spaces in a multi-level structure on BART-owned land, including about 400 site replacement spaces.

PROJECT JUSTIFICATION:

This project involves development of approximately 1200 spaces in a multi-level parking facility. All 1652 currently available BART parking spaces are filled by 7:00 a.m., limiting midday station accessibility when rail capacity is available. Potential net revenue lost due to this inaccessibility is estimated at $1,843,000 per year based on the current fare structure. Loss of revenue potential will increase further upon completion of BART's Capacity Expansion Proram, as rail capacity will become available during peak as well as off-peak periods.

Over 350 patron cars parked on nearby streets in 1983, displacing parking for local residents and creating neighborhood parking problems. The BART patron parking shortage projected for 1988 is 2,025 spaces. The parking shortage will be accentuated by capacity improvements anticipated with the Capacity Expansion Program.

Additional parking will be necessary to optimize rail efficiency even if the access mode shares supplied by bus transit and carpools remains constant or even increases. Recent experience and projected patronage growth indicates substantially higher absolute numbers of patrons arriving at the station by all modes, including autos.

BART anticipates that most of the autos attracted to new parking will be drawn from regional commuters now utilizing freeways and other congested arteries for their entire commute, and not from current BART patrons now using buses or other access modes. This parking project would therefore remove the major portion of each of these regional trips from the highways, including some of the most severely congested segments in the Bay Area.

Finally, additional parking would allow BART to provide more parking for handicapped patrons and carpools.

CONCORD STATION ACCESS IMPROVEMENTS (03SH)

PROJECT COST:

$13,808,000

PROJECT DESCRIPTION:

Bus transit interface improvements and approximately 1380 parking spaces in a multi-level structure on BART-owned land, including about 180 site replacement spaces.

PROJECT JUSTIFICATION:

BART system access is a continuation of the Capacity Expansion Program; a multi-year project given high priority by UMTA, the State and BART. Developing adequate station access facilities will be essential to maximize the productivity of other elements of the Capacity Expansion Program.

Existing bus service at the Concord Station includes nine CCCTA scheduled routes, two BART Express Bus lines, and numerous private shuttle services. Preliminary discussions with CCCTA indicate that future service levels may more than double the number of simultaneous bus loadings. This program concept is consistent with the proposed project design.

Transit coordination improvements will be designed to include sheltered walkways and waiting areas for transit passengers; improved signage and transit information; adequate bus bays for an increased number of simultaneous off-loadings and boardings; and fast, safe access for these buses. This project could provide more convenient and attractive regional transit options for existing and future BART patrons.

The multi-level parking structure will be designed to provide approximately 1380 patron parking spaces within close proximity to the station entrance, and to expand the number of arriving carpool and handicap spaces.

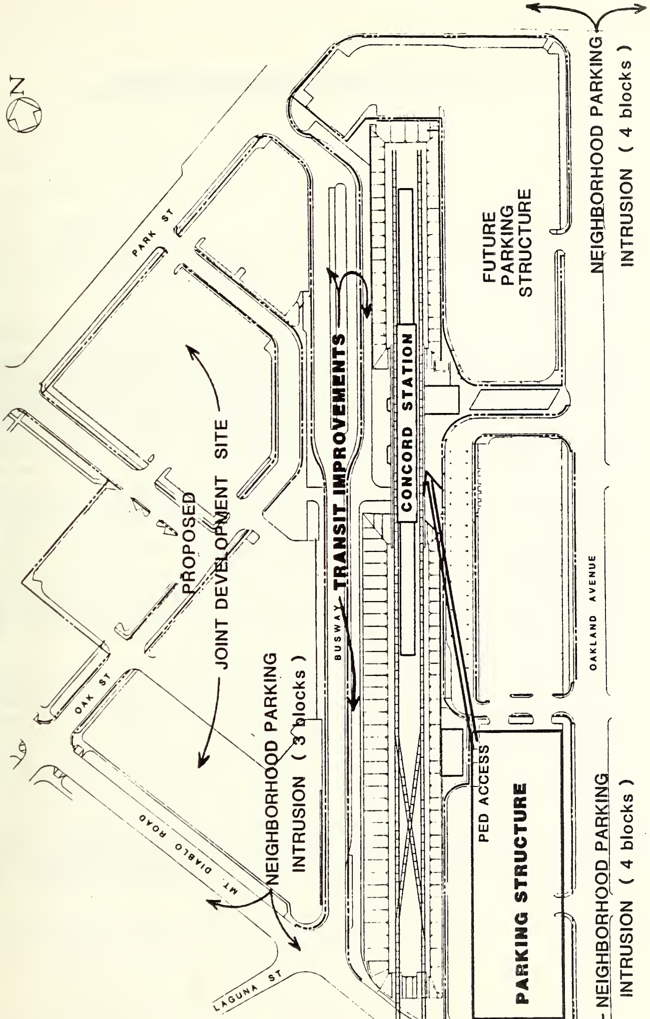
Currently all 1900 available BART-provided parking spaces are filled by 7:00 a.m. Consequently it is estimated that over 370 patron cars are parked on nearby streets and parking lots, displacing parking for local residents and business. The existing parking shortage severely limits midday station access, when ample rail patron capacity is available.

BART patron parking shortage at Concord Station is projected to be 1050 vehicles in 1988. The problem will be accentuated by implementation of the Capacity Expansion Program. This project responds directly to demands for more on-site station parking.

New parking and transit facilities at Concord Station will improve station access and help BART achieve future patronage projections. The estimated net lost revenue due to the projected parking shortage and based on the current fare structure is $1,993,000 annually for this station. Loss of revenue potential will increase further upon completion of the Capacity Expansion Program.

Concord Station has a proposed joint development project which would greatly benefit from the proposed project. Additional development potential could result in long term benefits to patronage, land values and land uses in the station area.

The proposed project will replace approximately 370 off-site patron parking spaces, about 180 on-site spaces needed for parking structure construction, and numerous spaces required for the intermodal transit facilities. In the coming years, Concord Station parking lots will require repairs and maintenance. If those repairs were coordinated with construction of parking and transit improvements, cost savings could be realized.



CONCORD STATION

RAILROAD AVENUE PARK/RIDE FACILITY (04IA)

PROJECT COST:

$568,000

PROJECT DESCRIPTION:

200 new parking spaces in a park/ride lot to provide access to BART Express Bus lines and thus BART rail lines.

PROJECT JUSTIFICATION:

All parking spaces at the Concord station (most heavily utilized by East County residents) are filled by 7:00 a.m. This lack of accessibility results in diversion of potential patronage to other transportation modes, principally automobiles. Such diversion deprives BART of potential revenue which could be realized by filling available Express Bus and rail capacity. Based on the current fare structure, BART lost $1,993,000 in potential net revenue at Concord alone. This loss of potential revenue will grow as the BART Capacity Expansion Program is implemented.

BART is currently streamlining Express Bus operations to more closely approximate the level of service offered on BART rail lines, i.e. fewer stops and faster trip times. One consequence of this effort is that local neighborhood on-street accessibility will decrease in favor of a limited number of access points oriented to the freeway system.

Although BART anticipates a significant level of local transit operator service to these centralized Express Bus access points, the fact that they will be located in low density suburban settings suggests strongly that parking facilities will be required as well.

BART is committed to streamlining the "P" Route Express Bus between Concord and Antioch. BART has completed park/ride lots at North Concord, Bailey Road and Hillcrest Avenue. The proposed project would be the fifth of five facilities needed to complete streamlining of the system.

BART Board has committed prior funding for a portion of this project through implementation of the Revenue Bond Program.

Patrons will benefit from faster trip times and from increased Express Bus and rail system accessibility, making the regional transit option more convenient and attractive. This project will benefit all BART patrons by helping optimize the financial efficiency of both bus and rail operations through greater utilization of available capacity.

EL CERRITO DEL NORTE STATION ACCESS IMPROVEMENTS (05KH)

PROJECT COST:

$12,532,000

PROJECT DESCRIPTION:

Bus transit interface improvements and approximately 1200 parking spaces in a multi-level structure on BART-owned land, including about 360 site replacement spaces.

PROJECT JUSTIFICATION:

BART system access is a continuation of the Five Year Capacity Expansion Program; a multi-year project given high priority by UMTA, the State and BART. Developing adequate station access facilities will be essential to maximize the productivity of other elements of the Capacity Expansion Program.

Existing bus service to the del Norte Station includes ten AC Transit routes and two BART Express Bus routes. Preliminary discussions with AC Transit indicate that this station may become a transit center allowing for timed transfers and a need to accommodate approximately twelve buses simultaneously. This program concept is consistent with the proposed project design.

Transit coordination improvements will include sheltered walkways and waiting areas for transit passengers; improved signage and transit information; adequate bus bays for twelve or more simultaneous off-loadings and boardings; and fast, safe access for these buses. This project would provide more convenient and attractive regional transit options for existing and future BART patrons.

The multi-level parking structure will be designed to provide approximately 1200 patron parking spaces within close proximity to the station entrance, and to expand the number of arriving carpool and handicap spaces.

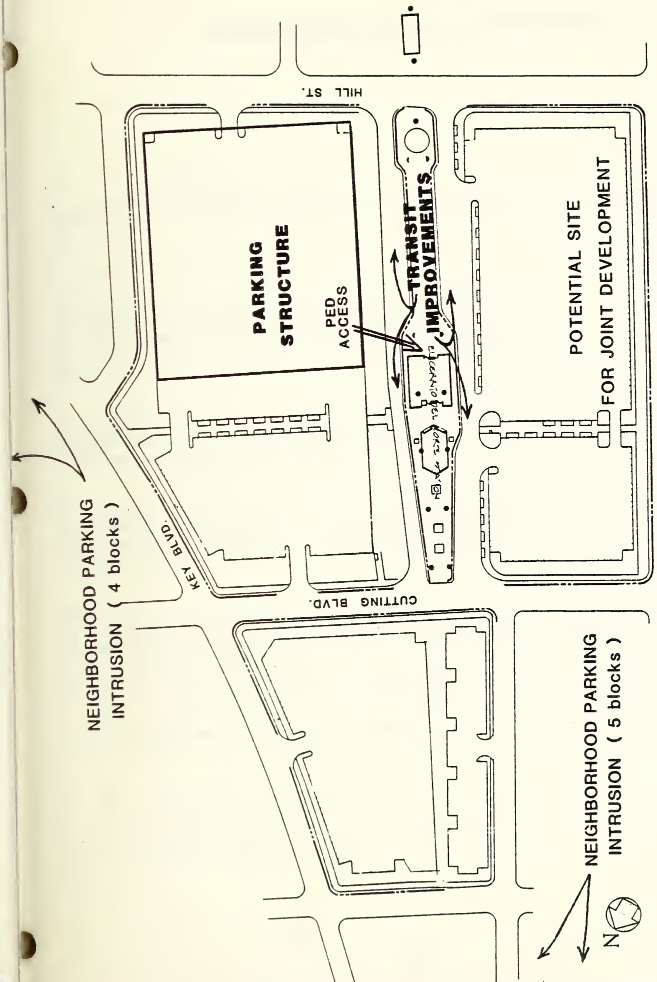
Currently all 1600 available BART-provided parking spaces are filled by 7:30 a.m. Consequently it is estimated that over 400 patron cars are parked on nearby streets, displacing parking for local residents and business. The existing parking shortage severely limits midday station access, when ample rail patron capacity is available.

BART patron parking shortage at the El Cerrito del Norte Station is projected to be 1115 vehicles in 1988. The problem will be accentuated by implementation of the Capacity Expansion Program. This project responds directly to demands for more on-site station parking.

New parking and transit facilities at del Norte Station will improve station access and help BART achieve future patronage projections. The estimated net lost revenue due to the projected parking shortage and based on the current fare structure is $733,000 annually for this station. Loss of revenue potential will increase further upon completion of the Capacity Expansion Program.

El Cerrito del Norte Station has joint development potential which could be enhanced by the proposed project. That potential could result in long term benefits to patronage, land values and land uses in the station area.

The proposed project will replace approximately 400 off-site patron parking spaces, about 360 on-site spaces needed for parking structure construction, and numerous spaces required for the intermodal transit facilities. In the coming years, del Norte Station parking lots will require additional repairs and maintenance. If those repairs were coordinated with construction of parking and transit improvements, cost savings could be realized.


NEIGHBORHOOD PARKING INTRUSION (4 blocks)
KEY BLVD.
PARKING STRUCTURE
PED ACCESS
TRANSIT IMPROVEMENTS
EL CERRITO DEL NORTE
HILL ST.
CUTTING BLVD.
POTENTIAL SITE FOR JOINT DEVELOPMENT
SAN PABLO AVE.
NEIGHBORHOOD PARKING INTRUSION (5 blocks)
N

EL CERRITO DEL NORTE STATION

MACARTHUR STATION ACCESS IMPROVEMENT (07GH)

PROJECT COST:

$12,140,000

PROJECT DESCRIPTION:

Bus transit interface improvements and approximately 900 parking spaces in a multi-level structure on BART-owned land, including about 260 site replacement spaces.

PROJECT JUSTIFICATION:

All 585 currently available BART parking spaces are filled by 7:30 a.m., limiting midday station accessibility when rail capacity is available. Potential net revenue lost due to this inaccessibility is $236,000 per year. Loss of revenue potential will increase upon completion of BART's capacity increase program, as rail capacity will become available during peak as well as off-peak periods.

Over 125 patron cars parked on nearby streets in 1983, displacing parking for local residents and businesses. The BART patron parking shortage projected for 1988 is 750 spaces. The problem may be accentuated by the impending implementation of station area parking restrictions on non-resident parking.

Additional parking will be necessary to optimize rail efficiency even if the access mode shares supplied by bus transit and carpools remains constant or even increases. Recent experience and projected patronage growth indicates substantially higher absolute numbers of patrons arriving at the station by all modes, including autos.

BART anticipates that most of the autos attracted to new parking will be drawn from regional commuters now utilizing freeways and other congested arteries for their entire commute, and not from current BART patrons now in using buses or other access modes. This parking project would therefore remove the major portion of each of these regional trips from the highways, including some of the most severely congested segments in the Bay Area.

Finally, additional parking would allow BART to provide more parking for handicapped patrons and carpools.

OAKLAND WEST STATION ACCESS IMPROVEMENTS (11EH)

PROJECT COST:

$12,117,000

PROJECT DESCRIPTION:

Bus transit interface improvements and approximately 1000 parking spaces in a multi-level structure on BART-owned land, including about 270 site replacement spaces.

PROJECT JUSTIFICATION:

BART system access is a continuation of the Capacity Expansion Program; a multi-year project given high priority by UMTA, the State and BART. Developing adequate station access facilities will be essential to maximize the productivity of other elements of the Capacity Expansion Program.

Existing bus service to the Oakland West Station is limited to five AC Transit routes. Preliminary discussions with AC Transit indicate that this station may become a transit center allowing for timed transfers and a need to accommodate approximately seven buses simultaneously . This program concept is consistent with the proposed project design.

Transit coordination improvements will be designed to include sheltered walkways and waiting areas for transit passengers; improved signage and transit information; adequate bus bays for seven or more simultaneous off-loadings and boardings; and fast, safe access for these buses. This project would provide more convenient and attractive regional transit options for existing and future BART patrons.

The multi-level parking structure will be designed to provide approximately 1000 patron parking spaces within close proximity to the station entrance, and to expand the number of arriving carpool and handicap spaces.

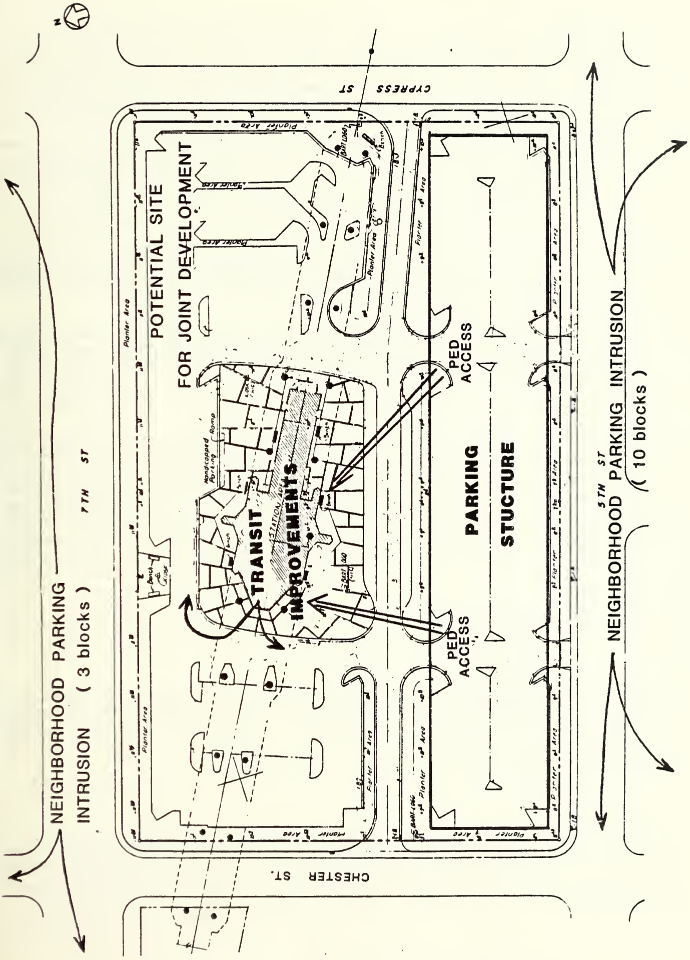
Currently all 400 available BART-provided parking spaces are filled by 7:00 a.m. Consequently it is estimated that over 800 patron cars are parked on nearby streets and parking lots, displacing parking for local residents and business. The existing parking shortage severely limits midday station access, when ample rail patron capacity is available.

BART patron parking shortage at Oakland West Station is projected to be 2430 vehicles in 1988. The problem may be accentuated by possible city-enforced station area parking restrictions and ongoing peak hour capacity improvements anticipated with implementation of the Capacity Expansion Program. This project responds directly to demands for more on-site station parking.

New parking and transit facilities at Oakland West Station station will improve access and help BART achieve future patronage projections. The estimated net lost revenue due to the projected parking shortage and based on the current fare structure is $1,670,000 annually for this station. Loss of revenue potential will increase further upon completion of the Capacity Expansion Program.

Oakland West Station has joint development potential which could be enhanced by the proposed project. That potential could result in long term benefits to patronage, land values and land uses in the station area.

The proposed project will replace approximately 600 off-site patron parking spaces, about 270 on-site spaces needed for parking structure construction, and numerous spaces required for the intermodal transit facilities. In the coming years, the Oakland West Station parking lot will require additional repairs and maintenance. If those repairs were coordinated with construction of parking and transit improvements, cost savings could be realized.



OAKLAND WEST STATION

Extensions

The original plan for the BART system included a multi-phased program to provide rail service well beyond areas presently served. The withdrawal of San Mateo and Marin counties prior to the 1962 bond election resulted in voter approval of 71-mile basic system in the current three-county District and indefinitely postponed further development of the rail system. Over the years, the District has continued to coordinate expansion plans with local agencies while investigating the full impacts of extending the system. Extension plans have received intensive public and private review, and they continue to be revised and updated in response to regional growth and changing economic conditions. The District's adopted extension policy is summarized on page _____.

As an interim measure until extensions can be constructed, BART provides express bus service between key transfer stations and regional travel corridors in the District not presently served by rail.

Past study has identified BART extensions to serve regional transit needs in three Phase I travel corridors located in the current three-county District: Pittsburg-Antioch, Warm Springs (Fremont), and Livermore-Pleasanton (Tables 5-7 summarize statistical data for these three extensions). The BART Extension Staging Policy also commits the District to a San Francisco project to be identified through coordination with San Francisco as well as identifies District interest in a West Contra Costa I-80 corridor extension, an Oakland Airport connector to the BART system and a San Ramon Valley Corridor project which would parallel I-680. In addition to these corridors, BART has also been investigated as a potential regional transit improvement in the Daly City to the San Francisco Airport Corridor (Southern Pacific's San Bruno branchline) in San Mateo County, in the Bayshore (US-101) corridor in San Mateo and Santa Clara counties and in the Southern Pacific/Union Pacific Railroad corridor in East Bay Santa Clara County. These latter three extensions, however, involve resolving the issues of extending BART outside the three-county District priority.

FY 1986/87 Accomplishments

Right-of-Way Acquisition

BART acquired one parcel of land for the future site of the Warm Springs Station. As of December 1986, this brings the total number of parcels acquired to fourteen or 61% of the 23 land parcels required for Priority I Extensions right-of-way. For additional details regarding Extensions right-of-way acquisition, see Table 8.

Planning Studies

Fremont-South Bay AA/DEIS: The purpose of this study is to develop transportation alternatives in the corridor between the BART Fremont Station and the cities of Milpitas, San Jose, Santa Clara, Sunnyvale and Mountain View. An environmental impact assessment will be conducted of these alternatives.

This AA/DEIS/DEIR was initiated in August 1986. This study will take 22 months to complete conceptual design, analysis and environmental review of various transit alternatives in this corridor. Suggested transit alternatives are bus, light rail and BART. At the end of the study, a preferred alternative will be selected. Final environmental analyses and preliminary engineering will be conducted on the preferred alternative.

The first round of workshops for public input on model issues was held in December 1986. A purpose and needs report and a scoping meeting summary have also been completed.

Pittsburg-Antioch Corridor AA/DEIS/DEIR: The purpose of this study is to conduct a detailed analysis of transportation development alternatives for the extension of the BART Concord Line from its present terminus in downtown Concord easterly to Pittsburg and Antioch, and to prepare an Environmental Impact Statement on the alternatives considered.

This AA/DEIS/DEIR was initiated in November 1986, will also take 22 months to complete and involves the same process as described in the Fremont-South Bay study. Once a preferred alternative is selected, final environmental analyses and preliminary engineering will be conducted. Suggested alternatives for this corridor are also bus, light rail and BART. The scoping meeting was conducted in January 1987.

Livermore-Pleasanton Extension: The Livermore-Pleasanton Extension Study Supplemental Analysis was completed in February 1986. The purpose of the study was to recommend a BART extension alignment from Pleasanton to Livermore from various proposed alternatives. The alignment selected was to follow I-580 out to East Livermore. The BART Board of Directors adopted this alignment in March 1986. This alignment adoption supplements the previously adopted BART alignment from the existing BART Bay Fair Station to the proposed Castro Valley and Dublin stations along Highway 238 and Interstate 580.

BART is currently involved in a study with the Livermore-Amador Valley Transit Authority (LAVTA). This study grew out of Measure B which was approved by the voters of Alameda County in November 1986. One requirement of Measure B was for BART and LAVTA to conduct an analysis to determine whether the rail extension into this corridor would be BART or a light rail system.

The purpose of Measure B is to increase the state sales tax in Alameda by one-half cent to fund a variety of highway and public transit projects. One of the projects to be funded from Measure B is a rail extension into the Dublin corridor, which is equivalent to Phase I of BART's Livermore-Pleasanton Extension. Technically, the proceeds of this initiative can be used for both Alameda County BART rail extensions. However, the primary rail extension to be funded from Measure B is a rail extension into the Dublin corridor.

An analysis is therefore underway by BART and LAVTA to determine what type of rail extension will be constructed in the Dublin corridor. The cost for a Dublin corridor BART extension is $220 million, of which $170 million is to be funded with the proceeds of Measure B. The remaining $50 million would be provided from state, BART and other sources. It should be noted, however, that BART is required to match Measure B funds dollar-for-dollar from other funding sources.

This BART-LAVTA study was initiated in December 1986 with a scheduled completion date of June 1987. No Measure B funding will be allocated to the Fremont-South Bay Extension until the Dublin Corridor Extension is fully funded.

Future Outlook

The future performance objectives for the extensions program include completion of ongoing studies, completion of an environmental impact study in the Dublin corridor and continued efforts to acquire land for Extensions right-of-way.

Planned Improvements

Extension planning efforts within the current Five Year Plan timeframe will focus on completing the Alternatives Analysis/Final Environmental Impact Requirements for Phase I of the BART Extension Staging Policy. Concurrent efforts will focus on extension rights-of-way through continued implementation of the Extension Right-of-Way Acquisition Program. An additional task will determine the location of four West Contra Costa County extension stations.

(The several segments shown under each Roman numeral are understood to be implemented concurrently, to the extent that funding is available.)

(BART will be the operator for any new heavy or light rail transit starts or extensions within the three BART counties except for those projects developed by existing rail transit operators.)

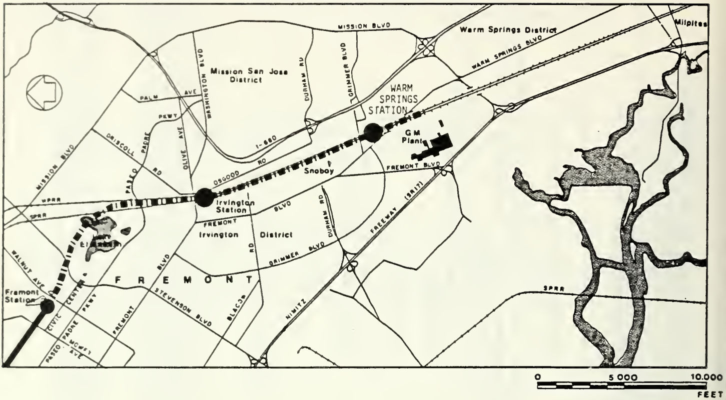
INSIDE CURRENT DISTRICT	OUTSIDE CURRENT DISTRICT (Subject to a satisfactory cost-sharing arrangement and parallel construction within the District.) **
I. North Concord/West Pittsburg Irvington/Warm Springs Castro Valley/Dublin San Francisco *	I. Colma/Tanforan/San Francisco Airport Milpitas
II. Pittsburg/West Antioch/East Antioch Pleasanton/West Livermore/East Livermore San Francisco * San Pablo/Hilltop Oakland Airport Connector	II. Millbrae - Menlo Park Milpitas - San Jose
III. San Francisco * Pinole/Hercules San Ramon Corridor	III. San Jose - Menlo Park

* Specific San Francisco Project to be identified through coordination with San Francisco. Section 29034.5 of the California Public Utilities Code Lists an extension of District services and facilities to the northwest section of the City and County of San Francisco as a District service commitment.

** Pursuant to Section 29034.5 of the California Public Utilities Code, only non-District funds may be spent by the District for the purpose of extensions services and facilities outside of District's January 1, 1971 boundaries until the District meets specified service commitments within the 1971 boundaries.

Board adopted September 1, 1983
Board amended February 2, 1984
Board amended October 23, 1986

TABLE 5
WARM SPRINGS EXTENSION

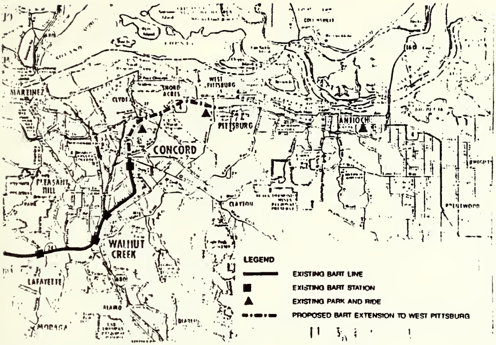


1. Alignment Description: The extension alignment would begin at the Fremont BART Station on embankment, then follow a subway direct routing under Lake Elizabeth and Fremont Central Park before moving alongside the Union Pacific Railroad right-of-way at grade or slightly depressed. The BART alignment would go into subway under Washington Boulevard to arrive at the Irvington Station and remain depressed to north of Durham Road. BART would pass under Durham Road and then rise on fill to cross over the Grimmer Boulevard underpass to arrive at the Warm Springs Station.
2. Route Mileage: 5.4 miles (a 4.8 mile extension with a .6 mile tailtrack)
3. Number and location of stations: 2 stations
    1) Irvington Station at Washington Boulevard (2.5 miles)
    2) Warm Springs Station at Grimmer Boulevard (2.3 miles)
4. Total Capital Cost (1987$): $370 Million
5. Proposed Capital Funding Plan

	Funded	Unfunded	Total
Federal	$ 0	$278M	$278M
Local	12M	80M	92M
Total	$ 12M	$358M	$370M

6. Average Weekday Ridership: 12,000 to 15,000 trips in 2000.
7. Project Status: Fremont to South Bay AA/DEIS-EIR, which includes the Warm Springs Extension, is underway and will be completed by May 1988. This detailed study will result in the selection of a preferred alternative for future project development. The Warm Springs Station site has been acquired along with a portion of the Irvington site and some track alignment rights-of-way.

TABLE 6
BART CONCORD TO WEST PITTSBURG EXTENSION



1. Alignment Description: Northward from existing BART Concord Station along abandoned Sacramento Northern Railroad paralleling Port Chicago Highway to Highway 4, then eastward along Highway 4 to West Pittsburg.

2. Route Mileage: 7.5 Miles (a 6.9 mile extension with a .6 mile tailtrack)

3. Number and location of stations: 2 stations

   1) North Concord/Martinez at Hwy. 4/Port Chicago Highway (2.6 miles)
   2) West Pittsburg at Hwy. 4/Bailey Road (4.3 miles)

4. Total Capital Cost (1987$): $425 million

5. Proposed Capital Funding Plan

	Funded	Unfunded	Total
Federal	$ 0M	$212M	$212M
Local	6M	207M	213M
Total	$ 6M	$419M	$425M

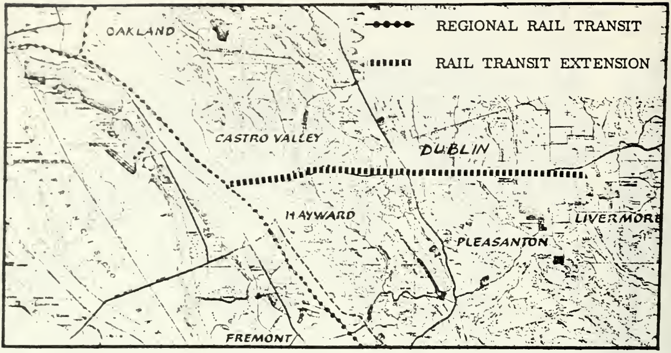
6. Average Weekday Ridership: 23,800 in 1990

7. Project Status: BART adopted this route in 1981 subsequent to the Pittsburg-Antioch BART Extension Project (1976) and related followup studies. The proposed North Concord/Martinez Station location is partially leased from the U.S. Navy with a 7-acre paved park/ride lot currently in operation for the BART Express Buses. BART has also acquired the proposed 20-acre station at West Pittsburg and has a 2-acre paved park/ride lot in operation.

   This proposed extension is currently being analyzed within the larger Pittsburg-Antioch Corridor Alternatives Analysis (AA) Study initiated in November, 1986 with the Urban Mass Transportation Administration and BART as the lead agencies. The AA will evaluate transportation improvement alternatives in the Corridor and will conclude in July 1988 with the preparation of appropriate environmental analyses and a recommendation of a locally preferred alternative, which involves selecting the preferred transit mode and alignment in the Corridor.

TABLE 7

Dublin Canyon Rail Extension



1. Alignment Description: Extends from the existing Bay Fair Station in San Leandro and the general route follows in or near State Route 238 and Interstate 580 terminating in the Cities of Dublin and Pleasanton.

2. Route Mileage: 12.8 miles (a 12.2 mile extension with a .6 mile tailtrack)

3. Number and location of stations: 2 stations
   1) Castro Valley Station - I-580/Redwood Road (3.8 miles)
   2) Dublin Station - I-580/I-680 (8.4 miles)

4. Total Capital Cost (1986$): $220 million

5. Proposed Capital Funding Plan

	Funded	Unfunded	Total
Local	$183 M	$37 M	$220 M

6. Average Weekday Ridership (yr. 2005): 24,414

7. Project Status: In November of 1986, Alameda County voters approved a 1/2¢ sales tax which provides $170 million for a Dublin Canyon Rail Extension. Whether this line will be light or heavy rail will depend on the outcome of a locally produced Alternatives Analysis. It is anticipated that this study, under the joint management of BART and the Livermore/Amador Valley Transit Authority, will be completed in June of 1987.

TABLE 8

ACQUISITION STATUS FOR PHASE/PRIORITY I

EXTENSION LAND REQUIREMENTS

(As of December 31, 1986)

STATION SITE OR ALIGNMENT	EXTENSION CORRIDOR	TOTAL REQUIRED	ALREADY ACQUIRED	UNWILLING SELLER	NOT YET ACQUIRED
East Antioch Station	Pittsburg-Antioch	5	4	0	1
West Pittsburg Station	Pittsburg-Antioch	2	2	0	0
North Concord Station	Pittsburg-Antioch	1	0	0	1*
Castro Valley Station	Livermore-Pleasanton	2	2	0	0
Dublin Station	Livermore-Pleasanton	2**	1***	0	1
Irvington Station	Warm Springs	7	3	0	4
Warm Springs Station	Warm Springs	1	1	0	0
Track Alignment, Irvington	Warm Springs	3	1	1	1
GRAND TOTAL		23**	14	1	8

* Lease with U. S. Navy signed during the January-March 1986 quarter for interim use as a BART express bus-park/ride facility. The District will pursue acquisition of this property.

** Reevaluation of land requirements for Dublin Station led to a reduction of 4 parcels relative to that reported last quarter as the result of the availability of alternate parcels to those previously identified as owned by "unwilling sellers."

*** Option Agreement to purchase parcel executed November 26, 1986 with escrow to close by April 1987.

EXTENSION R-O-W ACQUISITION (O-B-&)

PROJECT COST:

$71,672,000

PROJECT DESCRIPTION:

Acquisition of rights-of-way for the proposed Warm Springs, Pittsburg-Antioch, Livermore-Pleasanton and West Contra Costa BART extensions.

PROJECT JUSTIFICATION:

Expenditures on critical rights-of-way and facilities are deemed necessary to ensure that viable route alignments remain available for rail extensions pending funding for construction.

CHAPTER III

FINANCIAL PLAN

Description

Financing for the Capital Improvement Program is described here. Basically, funding comes from Federal, State, Regional or BART sources. As stated previously, BART's Capacity Expansion projects are virtually funded. Likewise, a number of the important basic system projects are funded. Funding for these two areas, while requiring continued attention, appears very likely.

Funding for the Parking projects and Extensions is not as likely. Continued cuts in the Federal Capital program are seriously impacting funding prospects. Parking projects could be funded from the Federal program, provided Regional priorities at the Metropolitan Transportation Commission (MTC) level supported them. In addition, a significant number of Parking projects are being funded from BART sources.

Extensions funding is of such a magnitude that the entire program is likely to require Congressional "earmarking." In the coming years, significant local consensus in support of the projects will have to develop to obtain Congressional action.

Cash Flow Projections

Tables 9 and 10, which follow, provide cash flow estimates for each of the projects in the program with the exception of extensions implementation. Projects are listed by type of equipment/structure and by FMS number within type. Extensions implementation funding is covered in a later table.

Cash flows shown in Tables 6 and 7 result in projections of annual cash requirements from each source. Tables 11 and 12 provide these projections by source. Overall the tables show some $888 million in projects that are scheduled and for which funds are planned for expenditure in the coming five years. Of that total, $709 million is funded.

TABLE 9

BART FIVE-YEAR FUNDED CAPITAL PROGRAM ($X1000)

		CASH FLOWS							
FMS NO.	PROJECT NAME	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
	GROUP: VEHICLE								
41GB	2ND GENERATN ATO/138 A-CAR SETS	0	50	5250	8500	0	0	0	13800
42AA	150 2ND GEN TRANS VEH W/ PRO ATC	40710	141819	55665	0	0	0	0	238194
	SUBTOTAL	40710	141869	60915	8500	0	0	0	251994
	GROUP: FACILITIES, MAINLINE								
0-B-	EXTENSIONS R.O.W. ACQUISITION	2662	34505	18099	0	0	0	0	55266
02AC	FREMONT-SO. BAY STUDY & AA/EIS	319	120	734	735	0	0	0	1908
03FL	BOOSTER FIRE PUMP/W PORTAL BHT	104	49	0	0	0	0	0	153
04AC	EIR & PREL ENGRG/ P-LINE PH 1	956	750	667	0	0	0	0	2373
08AB	L-LINE EXTENSION PLANNING	1110	573	0	0	0	0	0	1683
11--	DALY CITY TURNBACK & YARD	104213	43006	2581	0	0	0	0	149800
11TD	SHOP FACILITIES - DDY	796	2260	0	0	0	0	0	3056
	SUBTOTAL	110160	81263	22081	735	0	0	0	214239
	GROUP: FACIL., STATION & ACCESS								
0--&	PRKNG PROD IMPR (1942SP)	1800	3235	0	0	0	0	0	5035
01GG	100-SP ALAMEDA PRK/RD-FVS (III)	0	0	0	0	0	0	429	429
01NK	EMPLOYEE BREAK ROOM-HAS	0	27	15	0	0	0	0	42
010-	300-SP PKG EXPAN-HAS	0	2100	474	0	0	0	0	2574
01SD	CONSOLIDATE COMP RPR - OHY	0	235	0	0	0	0	0	235
01VG	500-SP SATELLITE LOT-UCS (II)	0	2200	1873	0	0	0	0	4073
03JE	PERM IMPRVT/CALTRANS LOT-LASII)	250	271	0	0	0	0	0	521
03NE	1200-SP WESTLOT EXPANSN-PHS II)	1183	951	0	0	0	0	0	2134
03NG	1600-SP REPLACEMENT PKG-PHS (I)	0	0	9000	9553	2000	0	0	20553
03PJ	AD'L ATC WORK SPACE @ TC RM-COY	0	45	0	0	0	0	0	45
03SJ	475-SP WST CONC (COWELL)LOT-CDS	0	200	328	0	0	0	0	528
04IA	PK/RIDE LOT RAILROAD AVE-PTS	0	130	0	0	0	0	0	130
04KA	PK/RIDE LOT/SOMERSVILLE RD-WAS	0	1320	0	0	0	0	0	1320
04RA	BRENTWOOD PARK/RIDE	0	290	0	0	0	0	0	290
05GB	ADD PRK FACILS/VIRGINIA ST-NBS	105	439	0	0	0	0	0	544
05KD	1164-SP PKG EXP/MAYFR-CNS (II)	10	0	0	0	0	0	2111	2121
05MD	COMPLETE WEST END OF LOT (RIS)	0	0	0	0	0	0	100	100
05NJ	AD'L ATC WRK SPACE @ TC RMS-RIY	41	30	0	0	0	0	0	71
06KA	500-SP PK/RIDE LOT/I&II-HRSIXR)	2000	1400	71	0	0	0	0	3471
08GA	1400-SP PK/RIDE LOT W/ BRDG-DUB	12000	400	2535	0	0	0	0	14935
10AJ	I-680 -X-BUS ON-RAMP PADS-SLRN	0	0	0	0	0	0	148	148
11ED	58-SPACE PARKING EXPN-OWS (II)	0	89	0	0	0	0	0	89
11EH	700-SP FRINGE PKG FACILITY-OWS	0	0	0	0	0	1000	3000	4000
11JF	PLAZA ENTRNCE FENCNG 16TH & 24TH	58	22	0	0	0	0	0	80
15AZ	WET STNDPIPES & FD CONNS-21 STA	802	416	0	0	0	0	0	1218
15LC	ESCALATOR REHAB PROGRAM	4290	1025	1185	0	0	0	0	6500
15NG	SELF OPERATN-ELEVATORS/HNDICPD	1531	1060	205	0	0	0	0	2796
15NH	TEXTURED PLATFORM EDGE III	704	639	0	0	0	0	0	1343
173S	5TH FLOOR REFURBISHMNT/1986-LMA	9	93	0	0	0	0	0	102
178U	REMODEL TELEPHONE CENTER - LMA	0	32	0	0	0	0	0	32
	SUBTOTAL	24783	16649	15686	9553	2000	1000	5788	75459
	GROUP: FACILITIES, SUPPORT								
01RB	VEHICLE WASHER-HAY	0	45	0	0	0	0	0	45
	SUBTOTAL	0	45	0	0	0	0	0	45

UP: TRAIN CONTROL

BART FIVE-YEAR FUNDED CAPITAL PROGRAM ($X1000)

FMS NO.	PROJECT NAME	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
		CASH FLOWS							
	GROUP: TRAIN CONTROL								
20--	WAYSIDE TC & SYSTEM PEFOR MODS	4246	2654	0	0	0	0	0	6900
20AC	ELIMINATE STATION INTERFACES	2113	287	0	0	0	0	0	2400
20EC	SUBWAY VENT TRAIN SEPARATN REM	0	47	0	0	0	0	0	47
21EB	ACI SYSTEM IMPROVEMENTS HAY	73	0	0	0	0	0	0	73
61--	INTEGRATED CONTROL SYSTEM - ICS	25789	3391	2679	0	0	0	0	31859
	SUBTOTAL	32221	6379	2679	0	0	0	0	41279
	GROUP: AFC & COMMUNICATIONS								
45AH	AC/BART/MUNI SUPER PASS	2634	444	662	0	0	0	0	3740
45BF	13M TICKET TRANSPORT RETROFIT	723	480	472	0	0	0	0	1675
45BK	MUNI FAST PASS ANTI-FRAUD MODS	0	35	0	0	0	0	0	35
45CK	CUBIC GATE MODS - BAR/AC/ PASS	0	670	0	0	0	0	0	670
79LC	PORTABLE RADIOS	0	46	0	0	0	0	0	46
	SUBTOTAL	3357	1675	1134	0	0	0	0	6166
	GROUP: ELECTRIFICATION								
03FK	2ND PWR TRANSFORMR/E.PORTL-BHT	192	67	0	0	0	0	0	259
09FE	RPLC PCB TRANSFORMERS @ SF VENT	355	280	93	0	0	0	0	728
15EG	ELECTRICAL CAPACITY IMPROVEMNTS	3799	2350	1641	0	0	0	0	7790
15EX	PG&E RATE EVAL/ALT SOURCES	116	60	0	0	0	0	0	176
	SUBTOTAL	4462	2757	1734	0	0	0	0	8953
	GROUP: PROCUREMENTS								
15CL	RAIL REPL PH V (86/7)	0	439	0	0	0	0	0	439
17HF	AFC MNT SHOP/EMP REL-XEROX-MET	0	32	0	0	0	0	0	32
79AC	NEW VANS FY 85/86	0	27	0	0	0	0	0	27
79AC	NEW VANS FY 87/88	0	32	0	0	0	0	0	32
79AD	NEW PICKUPS FY 85/86	0	15	0	0	0	0	0	15
79AD	NEW PICKUPS FY 87/88	0	11	0	0	0	0	0	11
79KF	NEW SAFETY EQUIPMENT-TR-117	0	76	0	0	0	0	0	76
	SUBTOTAL	0	632	0	0	0	0	0	632
	GROUP: OTHER COSTS								
11U-	DALY CITY INTERMODAL FACILITY	11	0	0	0	0	0	1289	1300
99*5	LAND AND LAND RIGHTS	0	121	0	0	0	0	0	121
99*5	AGENCY AND UTILITY AGREEMENTS	123	100	100	100	100	1000	0	1523
99*5	OTHER COSTS(INS.BOND AGENTS.ETC)	28	100	100	100	100	1442	0	1870
99*5	OUTSTANDING CLAIMS	0	0	0	0	0	3996	0	3996
99*5	PROJECT DEVELOPMENT	6250	5000	2750	2000	2000	2000	0	20000
99*5	PLANNING AND SA DVLPT.	1405	1609	1464	1503	1581	1666	0	9228
99*5	INVENTORY BUILDUP	10836	4670	1867	1000	2664	2370	0	23407
99*5	STA. AREA DEV.INFRASTR IMPVTS	0	1120	1046	1046	1047	1047	0	5306
99*6	IMPROVEMENT ALLOWANCE	3100	3100	3200	3300	3400	3500	0	19600
99*7	C-CAR START-UP	0	2000	0	0	0	0	0	2000
99*7	SPS JUSTIFIED PROJECTS	0	0	10000	0	0	0	0	10000
99*7	DALY CITY TURNBACK R E O'RUN	0	8000	0	0	0	0	0	8000
99*7	S.F. MUNI EXTENSION PROJECT	0	0	0	0	0	0	15000	15000
	SUBTOTAL	21753	25820	20527	9049	10892	17021	16289	121351
	GRAND TOTAL	237446	277089	124756	27837	12892	18021	22077	720118

TABLE 10

BART FIVE-YEAR UNFUNDED CAPITAL PROGRAM ($X1000)

FMS NO.	PROJECT NAME	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
	GROUP: VEHICLE								
418U	REINSTALL 6TH CAPAC. & MOD OLR								
	PROGRAM YEAR AMOUNT	163	0	0	0	0	0	0	163
	UNFUNDED CASH FLOW	150	13	0	0	0	0	0	163
	SUBTOTAL PROGRAM YEAR AMOUNT	163	0	0	0	0	0	0	163
	SUBTOTAL UNFUNDED CASH FLOW	150	13	0	0	0	0	0	163
	GROUP: FACILITIES, MAINLINE								
0-8-	EXTENSIONS R.O.W. ACQUISITION								
	PROGRAM YEAR AMOUNT	16406	0	0	0	0	0	0	16406
	UNFUNDED CASH FLOW	0	0	16406	0	0	0	0	16406
11TD	SHOP FACILITIES - ODY								
	PROGRAM YEAR AMOUNT	4854	0	0	0	0	0	0	4854
	UNFUNDED CASH FLOW	0	660	4194	0	0	0	0	4854
99*0	AERIAL BARRIERS PHASE I & II								
	PROGRAM YEAR AMOUNT	0	0	0	10738	0	0	0	10738
	UNFUNDED CASH FLOW	0	0	0	0	0	0	10738	10738
99*1	SYSTEM SAFETY UPGRADE PH III REM								
	PROGRAM YEAR AMOUNT	0	5000	0	0	0	0	0	5000
	UNFUNDED CASH FLOW	0	0	0	5000	0	0	0	5000
	SUBTOTAL PROGRAM YEAR AMOUNT	21260	5000	0	10738	0	0	0	36998
	SUBTOTAL UNFUNDED CASH FLOW	0	660	20600	5000	0	0	10738	36998
	GROUP: FACIL.,STATION & ACCESS								
01EE	435-SP PKG FACILITY-LMS(III)								
	PROGRAM YEAR AMOUNT	0	0	6485	0	0	0	0	6485
	UNFUNDED CASH FLOW	0	0	0	0	0	0	6485	6485
01GH	859-SP FRINGE PKG FACILITY-FVS								
	PROGRAM YEAR AMOUNT	0	0	10582	0	0	0	0	10582
	UNFUNDED CASH FLOW	0	0	0	0	0	1000	9582	10582
01NH	500-SP FRINGE PKG FACILITY BFS								
	PROGRAM YEAR AMOUNT	0	0	10809	0	0	0	0	10809
	UNFUNDED CASH FLOW	0	0	0	0	0	0	10809	10809
03HG	500-SP FRINGE PKG FACILITY-CR								
	PROGRAM YEAR AMOUNT	0	0	9023	0	0	0	0	9023
	UNFUNDED CASH FLOW	0	0	0	0	0	0	9023	9023
03JG	700-SP FRINGE PKG FACLTY-LAS(I)								
	PROGRAM YEAR AMOUNT	0	0	10654	0	0	0	0	10654
	UNFUNDED CASH FLOW	0	0	0	0	0	0	10654	10654
03_G	1265-SP FRINGE PKG FAC-WCS (I)								
	PROGRAM YEAR AMOUNT	0	14305	0	0	0	0	0	14305
	UNFUNDED CASH FLOW	0	0	0	0	0	1000	13305	14305
03NE	1200-SP WESTLOT EXPANSN-PHS (I)								
	PROGRAM YEAR AMOUNT	0	10738	0	0	0	0	0	10738
	UNFUNDED CASH FLOW	0	5049	5689	0	0	0	0	10738
0328	ADD PLATFORM STAIRWAY - CDS								
	PROGRAM YEAR AMOUNT	0	136	0	0	0	0	0	136
	UNFUNDED CASH FLOW	0	0	136	0	0	0	0	136
03SH	1385-SP FRINGE PKG FACL-CDS (I)								
	PROGRAM YEAR AMOUNT	0	0	13808	0	0	0	0	13808
	UNFUNDED CASH FLOW	0	0	0	0	1000	0	12808	13808

BART FIVE-YEAR UNFUNDED CAPITAL PROGRAM ($X1000)

FMS NO.	PROJECT NAME	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
	GROUP: FACIL.,STATION & ACCESS								
041A	PK/RIDE LOT RAILROAD AVE-PTS								
	PROGRAM YEAR AMOUNT	0	519	0	0	0	0	0	519
	UNFUNDED CASH FLOW	0	270	249	0	0	0	0	519
04KA	PK/RIDE LOT/SOMERSVILLE RD-WAS								
	PROGRAM YEAR AMOUNT	0	2125	0	0	0	0	0	2125
	UNFUNDED CASH FLOW	0	1680	445	0	0	0	0	2125
04RA	BRENTWOOD PARK/RIDE								
	PROGRAM YEAR AMOUNT	0	160	0	0	0	0	0	160
	UNFUNDED CASH FLOW	0	160	0	0	0	0	0	160
05KH	500-SP FRINGE PKG FACIL-CNS								
	PROGRAM YEAR AMOUNT	0	12532	0	0	0	0	0	12532
	UNFUNDED CASH FLOW	0	0	0	0	0	1000	11532	12532
07GH	500-SP FRINGE PKG FACILITY-MAS								
	PROGRAM YEAR AMOUNT	0	0	12140	0	0	0	0	12140
	UNFUNDED CASH FLOW	0	0	0	0	0	0	12140	12140
11EH	700-SP FRINGE PKG FACILITY-OWS								
	PROGRAM YEAR AMOUNT	0	8177	0	0	0	0	0	8177
	UNFUNDED CASH FLOW	0	0	0	0	0	0	8177	8177
11FG	2 END STAIRWAYS-PLATF/MEZZ-EMS								
	PROGRAM YEAR AMOUNT	0	387	0	0	0	0	0	387
	UNFUNDED CASH FLOW	0	387	0	0	0	0	0	387
15V-	PH IV SYSTEM ACCESSIBILITY IMPS								
	PROGRAM YEAR AMOUNT	0	0	420	0	0	0	0	420
	UNFUNDED CASH FLOW	0	0	0	0	0	0	420	420
	SUBTOTAL PROGRAM YEAR AMOUNT	0	49079	73921	0	0	0	0	123000
	SUBTOTAL UNFUNDED CASH FLOW	0	7546	6519	0	1000	3000	104935	123000
	GROUP: FACILITIES,SUPPORT								
01RM	EXPAND TRANSPORTATION BLDG-HAY								
	PROGRAM YEAR AMOUNT	265	0	0	0	0	0	0	265
	UNFUNDED CASH FLOW	100	165	0	0	0	0	0	265
03PH	EXPAND TRANSPORTATION BLDG-COY								
	PROGRAM YEAR AMOUNT	258	0	0	0	0	0	0	258
	UNFUNDED CASH FLOW	100	158	0	0	0	0	0	258
05NF	EXPAND TRANSPORTATION BLDG-RIY								
	PROGRAM YEAR AMOUNT	318	0	0	0	0	0	0	318
	UNFUNDED CASH FLOW	100	218	0	0	0	0	0	318
	SUBTOTAL PROGRAM YEAR AMOUNT	841	0	0	0	0	0	0	841
	SUBTOTAL UNFUNDED CASH FLOW	300	541	0	0	0	0	0	841
	GROUP: TRAIN CONTROL								
20--	WAYSIDE TC & SYSTEM PEFOR MODS								
	PROGRAM YEAR AMOUNT	0	8029	0	0	0	0	0	8029
	UNFUNDED CASH FLOW	0	4060	3608	361	0	0	0	8029
21EB	ACI SYSTEM IMPROVEMENTS HAY								
	PROGRAM YEAR AMOUNT	0	246	0	0	0	0	0	246
	UNFUNDED CASH FLOW	0	246	0	0	0	0	0	246
	SUBTOTAL PROGRAM YEAR AMOUNT	0	8275	0	0	0	0	0	8275
	SUBTOTAL UNFUNDED CASH FLOW	0	4306	3608	361	0	0	0	8275
	GROUP: AFC & COMMUNICATIONS								
473A	9 VENDORS & 8 ADDFARES/2D-GEN								
	PROGRAM YEAR AMOUNT	0	1320	0	0	0	0	0	1320
	UNFUNDED CASH FLOW	0	1320	0	0	0	0	0	1320
	SUBTOTAL PROGRAM YEAR AMOUNT	0	1320	0	0	0	0	0	1320
	SUBTOTAL UNFUNDED CASH FLOW	0	1320	0	0	0	0	0	1320

TABLE 10

	GROUP: ELECTRIFICATION								
20HB	ADD'L STATION ESSENTIAL POWER								
	PROGRAM YEAR AMOUNT	0	2034	0	0	0	0	0	2034
	UNFUNDED CASH FLOW	0	1000	1034	0	0	0	0	2034
	SUBTOTAL PROGRAM YEAR AMOUNT	0	2034	0	0	0	0	0	2034
	SUBTOTAL UNFUNDED CASH FLOW	0	1000	1034	0	0	0	0	2034
	GROUP: PROCUREMENTS								
15CM	2ND RAIL REPLCMT - PHS I 87/8								
	PROGRAM YEAR AMOUNT	0	281	0	0	0	0	0	281
	UNFUNDED CASH FLOW	0	281	0	0	0	0	0	281
79--	REPL MAINT EQ 84/6								
	PROGRAM YEAR AMOUNT	400	0	0	0	0	0	0	400
	UNFUNDED CASH FLOW	0	0	400	0	0	0	0	400
79--	REPL MAINT EQ 86/8								
	PROGRAM YEAR AMOUNT	0	400	0	0	0	0	0	400
	UNFUNDED CASH FLOW	0	0	400	0	0	0	0	400
79--	REPL MAINT EQ 88/90								
	PROGRAM YEAR AMOUNT	0	400	0	0	0	0	0	400
	UNFUNDED CASH FLOW	0	0	200	200	0	0	0	400
79B-	REPL OVERAGE SEDAN/MNT VEH (84/6								
	PROGRAM YEAR AMOUNT	0	2637	0	0	0	0	0	2637
	UNFUNDED CASH FLOW	0	0	2637	0	0	0	0	2637
79B-	REPL OVERAGE SEDAN/MNT VEH 86/88								
	PROGRAM YEAR AMOUNT	0	1096	0	0	0	0	0	1096
	UNFUNDED CASH FLOW	0	0	1096	0	0	0	0	1096
79B-	REPL OVERAGE SEDAN/MNT VEH (88/9								
	PROGRAM YEAR AMOUNT	0	0	370	0	0	0	0	370
	UNFUNDED CASH FLOW	0	0	370	0	0	0	0	370
79DA	NEW HI-RAILERS - GEN FY 86/87								
	PROGRAM YEAR AMOUNT	0	232	0	0	0	0	0	232
	UNFUNDED CASH FLOW	0	0	0	232	0	0	0	232
79DA	NEW HI-RAILERS - GEN FY 87/88								
	PROGRAM YEAR AMOUNT	0	75	0	0	0	0	0	75
	UNFUNDED CASH FLOW	0	0	0	75	0	0	0	75
	SUBTOTAL PROGRAM YEAR AMOUNT	400	5121	370	0	0	0	0	5891
	SUBTOTAL UNFUNDED CASH FLOW	0	281	5103	507	0	0	0	5891
	GRAND TOTAL PROGRAM YEAR AMOUNT	22664	70829	74291	10738	0	0	0	178522
	GRAND TOTAL UNFUNDED CASH FLOW	450	15667	36864	5868	1000	3000	115673	178522

BART FIVE-YEAR FUNDED CASH FLOW BY SOURCE ($X1000)

FUND SOURCE	PRIOR YRS	FISCAL YEAR 87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
FEDERAL FUNDS								
UMTA SEC 3 80% MONEY (UMTA3)	31741	32803	13016	0	0	0	0	77560
UMTA SEC 3 75% MONEY (UMTAD)	41903	51929	16166	0	0	0	0	109998
UMTA SEC 9 BLOCK GRANT (UMTA9)	47418	21762	6580	6800	0	0	0	82560
SUBTOTAL	121062	106494	35762	6800	0	0	0	270118
STATE FUNDS								
TP&D/SB-620 GUIDEWAY (GDWYT)	8468	17457	7040	0	0	0	0	32965
ART. XIX/PROP5 GUIDEWAY (GDWYA)	12107	5129	1448	1360	0	0	0	20044
SUBTOTAL	20575	22586	8488	1360	0	0	0	53009
REGIONAL FUNDS								
TDA	1648	285	405	0	0	0	0	2338
BRIDGE TOLLS (TOLL8)	9517	4179	1049	340	0	0	0	15085
STA	2666	988	170	0	0	0	0	3824
SUBTOTAL	13831	5452	1624	340	0	0	0	21247
BART FUNDS								
GENERAL CONSTRUCTION (OPERG)	8152	9674	3242	2109	3774	6313	100	33364
BASIC SYSTEM COMPLETION (OPERB)	6622	5237	2885	2000	2000	2000	0	20744
SYS. IMPROVEMENT RESERVE (OPERS)	2149	312	5	0	0	0	0	2466
DLY CTY CONST. FUND ALL. (OPERA)	1428	589	35	0	0	0	0	2052
INTEREST TRANSF. FUND (OPERT)	2643	9679	4704	0	0	0	1289	18315
ROW ACQUS. AND EXT. PLN. (ROW/E)	1632	4556	2331	128	0	0	148	8795
IMPROVEMENT ALLOWANCE (OPERI)	8410	5311	4872	3300	3400	3500	0	28793
OPERATING & UNKNOWN FUNDS(OPERO)	12611	1708	1275	667	60	60	0	16381
MULTI YR CAPITAL ALLOCNS (OPREM)	3251	2810	1464	1503	1581	1666	0	12275
REV. BOND CONST. FUND (OPERC)	35080	102681	58069	9630	2077	4482	20540	232559
SUBTOTAL	81978	142557	78882	19337	12892	18021	22077	375744
GRAND TOTAL	237446	277089	124756	27837	12892	18021	22077	720118

TABLE 12

BART FIVE-YEAR UNFUNDED CASH FLOW BY SOURCE ($X1000)

FUND SOURCE	PRIOR YRS	FISCAL YEAR 87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
FEDERAL FUNDS								
UMTA SEC 3 75% MONEY (UMTAD)	0	4720	7802	361	0	0	8053	20936
UMTA SEC 9 BLOCK GRANT (UMTA9)	0	3172	5604	220	0	0	0	8996
FEDERAL AID URBAN (FAU)	0	348	0	0	0	0	0	348
FEDERAL AID INTERSTATE (FAI)	0	5049	5689	0	0	0	0	10738
SUBTOTAL	0	13289	19095	581	0	0	8053	41018
STATE FUNDS								
ART. XIX/PROPS GUIDEWAY (GDWYA)	0	0	11406	0	0	0	0	11406
SUBTOTAL	0	0	11406	0	0	0	0	11406
REGIONAL FUNDS								
BRIDGE TOLLS (TOLLB)	0	314	1196	55	0	0	2685	4250
STA	0	30	31	0	0	0	0	61
SUBTOTAL	0	344	1227	55	0	0	2685	4311
BART FUNDS								
IMPROVEMENT ALLOWANCE (OPERI)	0	0	0	232	0	0	0	232
OPERATING & UNKNOWN FUNDS(OPERO)	450	2034	5136	5000	1000	3000	104935	121555
SUBTOTAL	450	2034	5136	5232	1000	3000	104935	121787
GRAND TOTAL	450	15667	36864	5868	1000	3000	115673	178522

Extensions

Much of the preliminary work for Extensions, including alternatives analysis and right-of-way acquisition, is included in the cash flow projections in the previous section. Schedules and cash flows for actual construction of Extensions in three corridors have been developed. However, they have been left out of the cash flow projections due to their magnitude and long term nature.

The funding plan by source for these projects is shown in Table 13. Of the funding sources shown in the table, a portion of the State Local amount identified for the Castro Valley/Dublin project has been funded. This occurred through voter approval in November 1986 of a sales tax measure to fund a rail extension in that corridor.

BART Reserves Projections

The cash drawdowns shown in Tables 9 and 10 result in drawing down BART reserves which are shown in Table 14. Starting with an estimate of cash balances in capital accounts as of the beginning of the planning period, interest is calculated at a 7% rate. This calculation results in anticipated interest earnings over the 5 years of some $30 million. Reserves plus interest and capital transfers from the operating result in an estimated balance available for expenditure in the 5-year period of $283 million.

Some $270 million in expenditures are planned from these capital sources. When these expenditures are subtracted from the balance available, the result is $13.7 million in contingency as shown in the table. This is thought to be a reasonable contingency given the magnitude of the Capital Improvement Program.

Table 13

EXTENSION PROJECTS BY FUNDING SOURCE

($000)

PROJECT	FUNDING SOURCE		
	UMTA 3	STATE & LOCAL	TOTAL
W. Pittsburg/North Concord	212,500	212,500	425,000
Irvington/Warm Springs	277,500	92,500	370,000
Castro Valley/Dublin	-0-	220,000	220,000
TOTAL	490,000	525,000	1,015,000

Table 14

SUMMARY OF BART RESERVE CASH BALANCES

(Estimate in $000's for 1991)

	Line Item	Cumulative Total
Income & Reserves:		
Cash Balances (Est'd for June 30, 1987)		248,745
- General Construction (Fund 01)*	29,361	
- Basic System Completion (Fund 01)*	10,296	
- System Improvement Reserve	5,486	
- Revenue Bond Construction Fund	181,670	
- Vehicle Fire Hardening Reserve	180	
- Interest Transfer Fund	17,745	
- DC Overrun Reserve/Full Funding Agmt.	360	
- DC Construction Fund Allocation	521	
- Multi-Year Capital Allocations	3,126	
Anticipated Interest		30,306
Capital Allocations from Operating Budget		4,260
Estimated Balance for Expenditures		283,311
Less:		
BART Obligations, Local Shares, and Costs Unavailable from Grant Sources, and Net Project Costs		(269,613)
Equal:		
Contingency Funds (Balance)		
- DC Full Funding Grant Agreement		360
- General		13,338
Total		13,698

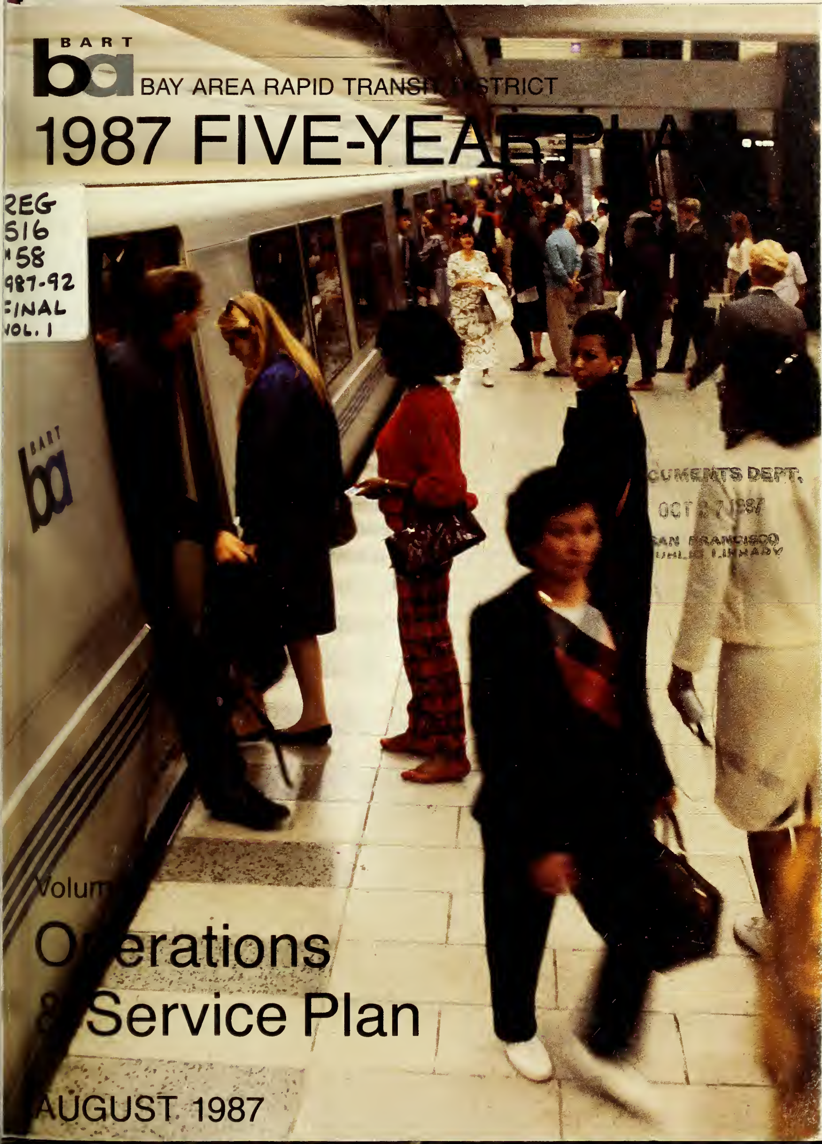
* Interest accrues to the Bond Fund and is available in the five year period; however, reserve balances do not change from year to year to reflect this since the interest does not actually accrue to the specific reserve.

BART

BAY AREA RAPID TRANSIT DISTRICT

1987 FIVE-YEAR PLAN

REG
516
.M58
1987-92
FINAL
VOL. 1



DOCUMENTS DEPT.
OCT 27 1987
SAN FRANCISCO
PUBLIC LIBRARY

Volume

Operations & Service Plan

AUGUST 1987

BART FACTS
FISCAL YEAR 1986/1987 DATA
(JULY 1986 - JUNE 1987)

FIXED FACILITIES

Mainline Track: Revenue service is provided over 71.5 miles of double mainline track, of which approximately 20 miles are in subway, 24 elevated, and 27 at grade.

Stations: There are 34 stations including 14 in subway, 13 elevated, and 7 at grade. Average station spacing is between 1/2 to 1 mile within and adjacent to San Francisco, Oakland, and Berkeley downtown areas, and 2 to 4 miles apart in suburban areas. Automatic fare collection equipment is located in each station to vend and process patron tickets. As of June 1987, BART provides 24,209 free paved parking spaces at 23 stations and 190 paved spaces at one additional station at a daily charge of 25¢ per space.

Maintenance Facilities: Equipment maintenance is performed at three Eastbay yards located in Hayward, Concord, and Richmond. A special track geometric vehicle is used to analyze the running rails and electrical third rail. Maintenance of right-of-way is routinely performed during off-revenue hours.

Administrative/Central Control Center: Trains are automatically controlled by wayside equipment and supervised by the central computer at BART headquarters located above the Lake Merritt Station in Oakland. Operators on board the leading A-car of each train have full voice communication with central control personnel and passengers on board, and can override automatic controls should the need arise.

ROLLING STOCK

Fleet Inventory: As of June 1987, BART owns 137 control equipped A-cars and 303 trail B-cars, of which 134 A-cars and all of the B-cars are in the operating fleet. Two A-cars are retained as engineering test vehicles. One additional A-car has been removed from the operating fleet as the result of heavy damage. Each vehicle contains 72 seats and is 10.5 feet wide. Vehicle lengths are 75 feet for A-cars and 70 feet for B-cars.

Trains: Train lengths range from 3 to 10 cars and consist of 2 A-cars (one at each end) and between 1 and 8 B-cars. Corresponding seating capacity is between 216 and 720 passengers. Top speed is 80 mph with a systemwide average of 33 mph, including station stops. Trains stop at each station along a designated route.

SERVICE HOURS

Rail: Rail service is provided between the hours of 5 am and 1:30 am Monday through Friday, 6 am to 1:30 am on Saturdays, and 9 am to 1:30 am on Sundays and major holidays. Closings for individual stations are timed with the schedule for the last train beginning at approximately midnight. Service frequencies (in minutes) for individual routes and line segments are as follows:

	TRANSBAY ROUTES			EASTBAY	CBD LINE SEGMENT	
	Concord-Daly City	Fremont-Daly City	Richmond-Daly City	Richmond-Fremont	San Francisco	Downtown Oakland
WEEKDAY						
Peak Hour	7.5	11	15	15	3.8**	3.8
Midday	15	15	15	15	5	5
Night	20	*	*	20	20	10
SATURDAY						
Daytime	20	20	20	20	6.7	6.7
Night	20	*	*	20	20	10
SUNDAY/HOLIDAY						
All Day	20	*	*	20	20	10

*Requires transfer between Concord/Daly City and Richmond/Fremont routes.
**3.0 minute headway service is operated during peak 15 minutes.

Express Bus: The District also provides express bus service within major travel corridors not served by rail in both Alameda and Contra Costa counties in the Eastbay. Bus service frequencies (in minutes) are as follows:

	Eastern Contra Costa	Western Contra Costa	Central Contra Costa-Alameda	Eastern Alameda
WEEKDAY				
Peak Hour	15	30	30	30
Midday	30	30	30	30
Night	60	60	60	60
SATURDAY				
Daytime	60	30	45	30
Night	60	60	60	60
SUNDAY/HOLIDAY				
All day	60	*	60	60

*No service during this time period.

(Continued on inside back cover)

1987

BAY AREA RAPID TRANSIT DISTRICT

FIVE YEAR PLAN

FOR THE PERIOD JULY 1987 THROUGH JUNE 1992

The preparation of this report has been financed in part through a grant from the United States Department of Transportation, Urban Mass Transportation Administration under the Urban Mass Transportation Act of 1964, as amended, as passed through the Metropolitan Transportation Commission.

The contents of this report reflect the views of BART, which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the original views or policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation.

August 1987

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

BOARD OF DIRECTORS

Margaret K. Pryor
President

Barclay Simpson
Vice President

Robert S. Allen

Nello Bianco

John Glenn

John H. Kirkwood

Arthur J. Shartsis

Arlo H. Smith

Wilfred T. Ussery

Keith Bernard
General Manager

Department of Planning, Budget and Research
Bay Area Rapid Transit District
800 Madison Street
Oakland, California 94607

TABLE OF CONTENTS

VOLUME I: OPERATIONS AND SERVICE PLAN

SUMMARY S-1

INTRODUCTION
1 BART Background and Five Year Plan Purpose
1 District Organizational Overview
4 Current System and Service Overview

CHAPTER I: PLANNING ISSUES
6 Future Demand Projections
20 New Peak Service Capacity
32 Service Quality
32 Cost Effectiveness and Productivity
35 Program Delivery
35 Extensions
36 Maintenance Requirements
36 Express Bus Effectiveness and Productivity
36 Energy Contingency Requirements
37 Capital Investment Planning
37 Privatization
38 Disadvantaged and Women Business Enterprise
38 Comprehensive Marketing
38 Five Year Planning Process

CHAPTER II: PERFORMANCE EVALUATION AND SERVICE IMPROVEMENTS
39 Car Availability
46 Scheduled Train Dispatches Completed
48 Service Delays
51 Transbay Throughput
53 Patron On-time Performance
55 Automatic Fare Collection System
57 Ridership
67 Financial Performance
78 Program Area Objectives

CHAPTER III: FIVE YEAR OPERATING FINANCIAL PLAN
84 FY 1987/88 Operating Budget
86 Anticipated Growth Rates
87 Additional Staffing Requirements
87 Five Year Operating Budget Plan

ATTACHMENT: PUBLIC COMMENT
92 Public Comment and BART Responses

UNDER SEPARATE COVER:
Volume II: Capital Improvement Plan
Volume III: Appendices

SUMMARY

BAY AREA RAPID TRANSIT DISTRICT
800 Madison Street
P.O. Box 12688
Oakland, CA 94604-2688
Telephone (415) 464-6000

August 1987

MARGARET K. PRYOR
PRESIDENT
BARCLAY SIMPSON
VICE-PRESIDENT
KEITH BERNARD
GENERAL MANAGER

DIRECTORS

BARCLAY SIMPSON
1ST DISTRICT
NELLO BIANCO
2ND DISTRICT
ARTHUR J. SHARTSIS
3RD DISTRICT
MARGARET K. PRYOR
4TH DISTRICT
ROBERT S. ALLEN
5TH DISTRICT
JOHN GLENN
6TH DISTRICT
WILFRED T. USSERY
7TH DISTRICT
ARLO HALE SMITH
8TH DISTRICT
JOHN H. KIRKWOOD
9TH DISTRICT

TO: **BART PATRONS AND DISTRICT RESIDENTS:**

The 1987 Five Year Plan represents the strategy by which BART intends to maintain service quality, expand train and station access capacity, attract new riders, and balance its operating budget despite growing financial problems.

In developing the 1987 BART Five Year Plan, assumptions of the previous plan were reviewed and updated as appropriate in light of new conditions and information. Performance toward BART's FY 1986/87 objectives has generally been very favorable. Train service quality measures stand at or above designated standards. Other District objectives have been met or exceeded, with the significant exception of ridership projections. Since January 1986, patronage has not returned to the previous growth curve, even though service quality was very good during the same period.

Stable or falling ridership has characterized most of the transit industry in recent months. Speculation as to the causes of this phenomenon includes lower service quality, increased fares, lower gasoline prices, increased car pooling, and relocation of employment to suburban sites. It is not yet clear which of these factors are most significant or how they will affect future patronage trends.

Despite the recent leveling off of BART ridership, the long-run outlook for additional patronage is considered to be good. Regional growth is expected to continue, but comparable expansion of highway facilities which parallel BART is not planned. Therefore, BART will be positioned to serve a growing travel market as its train service capacity is increased.

This plan update reaffirms the need for the District's Capacity Expansion Program despite potential operating budget deficits. Through this program, BART train service frequency and capacity will be improved in a series of increments as major capital projects needed to support higher service levels are completed.

The anticipated implementation schedule, similar to that in the previous plan, is summarized on page S-10, including proposed additional trains and supporting car requirements. The plan calls for adding capacity in four phases. This is documented in Volume I of the plan.

Station access improvements are also programmed to augment the additional train capacity. In the longer run, planning for BART extensions has been making noticeable progress, particularly with the mandate to build a rail project from Bayfair to Dublin expressed by the voters of Alameda County in Measure B last fall. Access improvements, extension efforts, and other details of the capital improvement plan are described in Volume II.

The five-year operating budget projections underscore the critical need facing BART and all other transit operators for additional financial assistance. Growth in ridership, farebox revenue, and other sources of operating funds are not projected to match increases in operating expense. The plan identifies an eight-part strategy to balance operating sources and uses without another fare increase which would further diminish ridership. This strategy calls for BART to improve service, mount a comprehensive marketing program and to carefully review and cut where possible all expenses not related to providing service and stimulating ridership. These steps will support deficit reduction efforts but will not be sufficient alone. Additional funding sources must be identified through the regional financial planning effort currently being conducted by the Metropolitan Transportation Commission.

BART's mission is to provide safe, convenient, reliable, and cost-effective transportation. BART service has generally measured up very well by these criteria. As capacity is expanded to meet long-range regional transportation requirements, the challenge to BART is to increase its marketing efforts so that ridership response contributes to greater system utilization and financial self-sufficiency.

Keith Bernard

Keith Bernard
General Manager

Figure A

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT POLICY

PREAMBLE TO DISTRICT GOALS AND OBJECTIVES

Based on the 1957 BART Commission Report, the statutes that created BART, the 1962 Composite Report, and principles of prudent business management, it is the policy of the San Francisco Bay Area Rapid Transit District to:

1. Maximize the effectiveness and efficiency of its operations and bring the system to its full potential.
2. Maximize the return on its investments in property, rights-of-way, and facilities.
3. Expand its service area to become the operator of an integrated regional trunk-line transit system which effectively serves interested counties in the Bay Area.

DISTRICT GOALS

1. Operate scheduled 4-route weekday service with route headways of 15 minutes or less during peak and midday periods and expand service within feasible, technical, and financial limits including improved peak-hour frequency of service and capacity where needed.
2. Improve the reliability performance of the present BART system.
3. Continue to improve BART system and patron safety and emergency preparedness.
4. Increase system utilization by promoting BART travel for all purposes with special emphasis on offpeak and reverse commute trips.
5. Fund and implement the necessary capital improvements and replacements to the system.
6. Operate within available funds without incurring an unfunded deficit.
7. Maximize the contribution to operating costs from passenger revenues, consistent with reasonable fare levels, to achieve a farebox ratio above 50%.
8. Make every effort to achieve District objectives for female and minority employment and minority business enterprise participation.
9. Improve system access by means of a comprehensive program of parking expansion, BART feeder services, transit coordination, and special projects addressing elderly and handicapped mobility.
10. Develop station area sites for the realization of increased patronage and revenues, and to enhance the communities BART serves.
11. Extend BART trunk lines within Bay Area travel corridors where feasible and in support of regional land use policies.

Figure B

BART OBJECTIVES FOR FY 1987/88

Program Area A: BASIC SYSTEM SERVICE AND CAPACITY

1. Balance capacity where possible such that load factors for peak period trains which can be lengthened or shortened (consists between 3 and 10 cars) are relatively equal but not less than 1.00, and provide offpeak service such that no train load factor exceeds 1.05.

2. Operate weekday peak period Transbay service in the peak direction providing at least 98.0% of scheduled train throughput and 97.5% of scheduled car throughput on a monthly average basis.

3. Make available 106 A-cars and 272 B-cars for revenue service by 4 AM.

Program Area B: RELIABILITY

1. Complete 99% of all scheduled dispatches.

2. Conduct operations such that 95% of daily terminal-to-terminal runs are completed within 5 minutes of scheduled run times with at least 93% during AM and PM peak periods for commute days.

3. Provide service such that no more than 2% of peak period trains experience a primary delay exceeding 7 minutes and no more than 6% experience a delay from any cause exceeding 7 minutes.

4. Conduct operations such that 94% of all patron trips are completed on-time. All patron trips are on-time when trains run not more than 5 minutes late or 60 seconds early.

5. Provide service such that passenger offload rates remain at or below the following: vehicle equipment = 1.00; wayside equipment = 0.08; operations and other = 0.40; and the total = 1.48 (per 1,000 car hours).

6. Maintain the overall AFC technician maintenance incident rate at or below 0.30 incidents per 1,000 passenger trips, and maintain or exceed a 6 AM average weekday availability rate of 95% for entry/exit gates and 90% for ticket vendors.

7. Maintain a 6 AM average weekday availability of 98% for elevators and 95% for escalators.

8. Maintain express bus on-time performance such that 95% of all runs arrive at their final destination within 5 minutes of schedule.

Figure B (Continued)

BART OBJECTIVES FOR FY 1987/88

Program Area C: SAFETY AND SECURITY

1. Continue to provide an environment for patron circulation through trains and stations such that the accident rate does not exceed 17.7 per million passengers.

2. Reduce the total annual amount of employee lost time due to injuries as a percent of time worked to 0.50% or less.

3. Conduct a minimum of one emergency plan exercise per month involving emergency response agencies.

Program Area D: PATRONAGE AND TRAVEL PROMOTION

1. At a minimum, achieve normal growth projections for average daily patronage as follows (in 1,000's):

	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	FY 87/88
Average Weekday:	199.2	201.0	199.0	204.6	201.1
4-hour Peak:	96.2	99.8	98.3	100.6	98.8
Offpeak:	103.0	101.2	100.7	104.0	102.3
Saturday:	80.0	88.0	82.0	84.0	83.5
Sunday:	48.3	48.6	48.9	49.1	48.7

2. Maintain at least 150 offsite ticket outlets at banks and retail establishments available to the general public, in addition to employer distribution program, with adequate coverage throughout the District.

Figure B (Continued)

BART OBJECTIVES FOR FY 1987/88

Program Area E: FINANCIAL AND OPERATIONAL EFFICIENCY

1. Maintain a funded budget and farebox ratios of no less than 10.3% for BART express bus operations, 50.2% for rail operations, and 46.1% for systemwide operations.

2. Maintain a system operating ratio of no less than 49.9%.

3. Maintain a rail cost per passenger mile of 21.3¢ or less.

4. Achieve a level of service output such that 15,000 vehicle miles are produced per equivalent District employee (based on 2,000 hours worked, including overtime and excluding capitalized labor).

5. Improve system utilization (passenger miles per seat mile) to 33.7% through continued monitoring of train capacity to match passenger demand patterns.

6. Maintain a paid sick leave rate of no more than 3.5% (9.1 paid days) annually per employee.

7. Transmit key performance reports to the Board of Directors, Department Managers, and/or other recipients within the following number of working days after the close of each reporting period: Monthly Patronage Report (10), Monthly Budget Performance Report and Quarterly Affirmative Action Report (15), Quarterly Financial Statements (25), Quarterly Performance Report on System Objectives (35), Quarterly Operations Performance Report (45), and the Annual Report (75).

8. Reduce the number of District objectives by 25%.

Program Area F: AFFIRMATIVE ACTION

1. Work to increase the workforce representation of women and minorities into targeted job categories from 20.0% in June 1986 to 22.1% by June 1988 in accordance with the 1987/91 Affirmative Action Plan.

2. Work to achieve 21% minority business enterprise participation for all District contracts determined to have MBE opportunities, with 18% DBE and 3% WBE participation for federally assisted contracts.

3. Work to achieve not less than 15% equity participation in District Joint Development Projects by women and minority individuals and/or business enterprises.

Figure B (Continued)

BART OBJECTIVES FOR FY 1987/88

Program Area G: SYSTEM ACCESS

1. Provide 1,894 new BART-owned paved parking spaces at existing rail stations.
2. Acquire funding for Pleasant Hill Station parking structure and initiate engineering design.
3. Initiate engineering design of Concord Station parking structure.
4. Advocate achievement of __% of BART/AC bus connections with coordinated schedules. (Level to be determined jointly with AC Transit as part of its route restructuring program).
5. Implement streamlining in the West and East Corridors.
6. Implement Express Bus/Rail ticket.
7. Complete 75% of station elevator conversions.
8. Complete platform edge installations at all stations.

Program Area H: JOINT DEVELOPMENT

1. Complete station area plans at Concord and MacArthur Stations, assuming local government cooperation.
2. Initiate station area planning process at Bayfair, El Cerrito del Norte, and El Cerrito Plaza Stations.
3. Assuming favorable market conditions, negotiate an acceptable ground lease agreement at at least one of the above sites.

Program Area I: EXTENSIONS

1. Complete the Fremont-South Bay Corridor Alternatives Analysis/Draft Environmental Impact Report.
2. Complete acquisition of at least three extension sites.
3. Complete the Pittsburg-Antioch Corridor Alternatives Analysis/Draft Environmental Impact Statement/Draft Environmental Impact Report.

BART OBJECTIVES FOR FY 1988/89 THROUGH 1991/92

Program Area A: BASIC SYSTEM SERVICE AND CAPACITY

- Operate 4-route weekday service with the capability of providing sustained 3 minute 10 second-headways by September 1988 following the completion of the Daly City Turnback reducing to 2 minutes 30 seconds by September 1989, and 2 minutes 15 seconds by September 1990 following the completion of remaining capacity expansion projects.

- Support the following weekday car requirements (as of the fourth quarter of each fiscal year):

Service Requirements	1989	1990	1991	1992
A-Cars	100	78	92	114
B-Cars	271	256	268	272
C-Cars	82	128	128	128
TOTAL	453	462	488	514
Service Distribution				
On-Line	396	400	426	452
Spares	57	62	62	62
TOTAL	453	462	488	514
Total Fleet				
A-Cars	135	135	135	135
B-Cars	303	303	303	303
C-Cars	96	150	150	150
TOTAL	534	588	588	588

Program Area B: RELIABILITY

- At a minimum, maintain current reliability objective level performance under higher density train operations.

Program Area C: SAFETY AND SECURITY

- Maintain current levels of patron and employee safety as measured by the patron accident rate and lost-time injury rate objectives.

Program Area D: PATRONAGE AND TRAVEL PROMOTION

- Maintain acceptable quality of service as reflected by accuracy of service announcements, employee helpfulness, and station cleanliness in support of achieving the following patronage levels (in 1000's):

	FY 88/89	FY 89/90	FY 90/91	FY 91/92
Average Weekday:	210,192	217,158	225,198	233,691
4-Hour Peak:	105,363	109,690	115,027	120,762
Offpeak:	104,829	107,468	110,171	112,929
Saturday:	85,603	87,758	89,965	92,217
Sunday:	49,937	51,194	52,482	53,795

- In addition to FY 1987/88 offsite ticket outlets, increase the number of outlets by 25 each fiscal year.

Figure C (Continued)

BART OBJECTIVES FOR FY 1988/89 THROUGH 1991/92

Program Area E: FINANCIAL AND OPERATIONAL EFFICIENCY

- Continue to provide cost-effective and efficient service through the achievement of key financial and operational efficiency objectives.

Program Area F: AFFIRMATIVE ACTION

- Work to increase the workforce representation of women and minorities into targeted job categories from 22.1% by June 1988 to 28.7% by June 1991 in accordance with the 1987-1991 Affirmative Action Plan.

Program Area G: SYSTEM ACCESS

- Complete parking redesign and surface parking projects.
- Complete parking facilities at Pleasant Hill and Concord.
- Complete Daly City Intermodal Facility.
- Complete park/ride lots in Dublin/Pleasanton, West Livermore, West Antioch, Pittsburg, and Hercules.
- Continue streamlining express bus service.
- Complete remaining 25% of station elevator conversions.

Program Area H: JOINT DEVELOPMENT

- Continue station area planning efforts in preparation for marketing specific sites for development.
- Market specific sites as market conditions and local plans permit.

Program Area I: EXTENSIONS

- Continue to implement the Extension Right-of-Way Acquisition Program.
- Complete the Alternatives Analysis and Final Environmental Impact Requirements for Phase I of the BART Extension Staging Policy.

FIGURE D

BART CAPACITY EXPANSION PROGRAM

6/15/87

Minimum Headway Capability (Min:Sec)	Projects Required To Achieve or Support This Headway	Anticipated Project Completion Dates	Target Expanded Service Start Dates	Peak Hour Trains Peak Direction Transbay	Peak Period Capacity Trains		On-Line Cars	Spare Cars	Total Cars Required	Available Fleet A/C-Cars @85% B-Cars @90% (Extra)	Operating Fleet Size	
3:45 (except for 3:00 during peak 15 minutes)	Current Service	---	Nov 86	17	45	A B T	90 248 338	16 24 40	106 272 378	113 (+7) 272 (+0) 385 (+7)	134 303 437[d]	A B T
	Delivery of 48 C-Cars	Dec 87	Jan 88	17	45	A C B T	76 41 248 365	16 0 24 40	92 41 272 405	114 (+22) 41 272 427 (+22)	135[e] 48 303 486	A C B T
3:10	Removal of Vent Separation	Oct 87										
	Electrical Capacity Increase: - Install 3rd Rail - Yard Feeder	Dec 87 Mar 88										
	Daly City Turnback	Apr 88										
	Delivery of 48 Additional C-cars (96 total)	Jun 88	Sep 88	19	51[f]	A C B T	86 76 234 396[f]	14 6 37 57	100 82 271 453	114 (+14) 82 272 (+1) 468 (+15)	135 96 303 534	A C B T
2:30	Daly City Yard	Jul 88										
	New On-Board ATC (A-Car Retrofit)	Jul 88										
	M-87 Interlocking	Dec 88										
	Delivery of 54 Additional C-Cars (150 total)	Dec 88										
	Wayside Train Control/System Performance Mods	Jul 89										
	Electrical Capacity Increase: - Procure/Install Substation	Sep 89	Sep 89	21	50[h]	A C B T	70 116 214 400[h]	8 12 42 62	78 128 256 462	114 (+36) 128 272 (+16) 514 (+52)	135 150 303 588	A C B T
	ICS	TBD[g]										
2:15	Brake Rate Algorithm Modifications	June 90	Sep 90	24[h]	53[i]	A C B T	78 122 226 426[i]	14 6 42 62	92 128 268 488	114 (+22) 128 272 (+4) 514 (+26)	135 150 303 588	A C B T

FOOTNOTES TO CAPACITY EXPANSION PROGRAM (Figure D)

[d] Status as of January 31, 1987; reflects 2 A-cars in use as engineering test vehicles and one A out for accident damage.

[e] Accident damaged A assumed to be repaired.

[f] Reflects addition of 3 trains and 13 cars on-line during peak; also includes 3 extra trains comprised of 18 cars and required for operation of Daly City Turnback (prior to system resignaling) which do not increase actual capacity during regular peak cycle.

[g] ICS is shown as necessary to support 2:30 headways assuming that more than 54 trains are required at this service level. Current plans are to operate less than 54 trains when this service increment commences. The planned upgrade to the existing train control computer is designed to accomodate up to 54 trains.

[h] Reflects addition of 2 trains and 22 cars on-line during peak (note: assumes requirement for 3 trains in Daly City Turnback is offset through resignaling).

[i] Reflects 3 trains and 26 cars in September 1990 with start of 2:15 headways. In the next and last year of the plan (FY 91/92), one additional train is projected bringing the peak hour Transbay count to 25 and the total trains on the system to 54. Car requirements during FY 91/92 are expected to increase by 26, bringing the total on-line to 452 and the total required including spares to 514 which equals the projected total cars available.

Figure E

1987 BART FIVE YEAR PLAN OPERATING PARAMETERS AND FORECASTS

	BUDGETED	FORECAST			
	FY 1987/88	FY 1988/89	FY 1989/90	FY 1990/91	FY 1991/92
SERVICE DELIVERY					
Minimum Scheduled Headway (min:sec)*	3:45**	3:10	2:30	2:15	2:15
Peak Period Trains Online*	45	48	50	54	54
Peak Period Cars Online*	365	396	400	426	452
Car Hours (1,000's)	1,103	1,151	1,113	1,155	1,208
Car Miles (1,000's)	30,203	31,516	30,499	31,631	33,083
PATRON RESPONSE					
Total Passenger Trips (1,000's)	58,369	60,773	62,731	64,969	67,327
Average Weekday Trips (1,000's)	201	210	217	225	234
Passenger Miles (1,000's)	733,600	762,701	787,274	815,361	844,954
FINANCIAL RESULT					
Total Operating Expense (1,000's)	$171,810	$187,320	$199,340	$211,341	$223,742
System Operating Ratio	49.9%	47.3%	45.6%	44.5%	43.5%
Rail Farebox Ratio	50.2%	48.2%	46.6%	45.4%	44.3%
Rail Cost Per Passenger Mile	21.3¢	22.4¢	23.2¢	23.8¢	24.4¢
DISTRICT STAFFING					
Headcount#	2,364.5	2,453.5	2,482.5	2,502.5	2,513.5

*Maximum service level programmed during respective fiscal years.

**Except for 3:00 headway during peak 15 minutes.

#Includes capitalized and other reimbursable positions as of June each fiscal year.

Figure F

BART FIVE-YEAR OPERATING BUDGET PROJECTIONS SUMMARY

($ Millions)

	86/87 ACTUAL	87/88	88/89	89/90	90/91	91/92
REVENUES						
Net Passenger Revenue	77.7	79.2	83.4	86.1	89.1	92.4
Other Operating Revenue	6.9	6.5	5.1	4.8	4.9	4.9
Total Net Operating Revenues	84.6	85.7	88.5	90.9	94.0	97.3
EXPENSES						
Net Labor	110.9	115.3	127.0	135.3	143.2	151.3
Electric Power	17.1	18.1	20.1	21.9	23.7	25.6
Purchased Transportation	15.3	15.7	16.1	16.6	17.0	17.6
Other Nonlabor	18.9	22.7	24.1	25.5	27.4	29.3
Total Operating Expenses	162.2	171.8	187.3	199.3	211.3	223.8
OPERATING DEFICIT	(77.6)	(86.1)	(98.8)	(108.4)	(117.3)	(126.5)
FINANCIAL ASSISTANCE						
Property & Sales Tax	94.5	96.7	101.6	106.6	112.0	117.6
TDA & STA	1.1	2.3	0.4	0.4	0.4	0.4
Debt Service Allocations	(13.5)	(12.6)	(14.5)	(14.5)	(14.6)	(14.6)
Capital & Other Allocations	(4.5)	(4.7)	(4.9)	(5.1)	(5.3)	(5.5)
Total Financial Assistance	77.6	81.7	82.6	87.4	92.5	97.9
NET FINANCIAL RESULT	(0.03)	(4.4)	(16.2)	(21.0)	(24.8)	(28.6)
FINANCIAL INDICATORS						
Rail Farebox Ratio	52.4%	50.2%	48.2%	46.6%	45.4%	44.3%
System Operating Ratio	52.2%	49.9%	47.3%	45.6%	44.5%	43.5%
Rail Cost Per Passenger Mile	21.1¢	21.3¢	22.4¢	23.2¢	23.8¢	24.4¢

Figure G

FIVE-YEAR CAPITAL PROGRAM SUMMARY

Expenditures, Cash Flow Basis

(000)

	Prior* Years	Budgeted FY 87/88	Projected FY 88/89	Projected FY 89/90	Projected FY 90/91	Projected FY 91/92	Projected Within 5 Year	Cumulativ Total
Vehicle								
Funded	36,150	105,089	92,498	8,524	0	0	0	242,261
Unfunded	0	0	0	0	0	0	0	0
Facilities, Mainline								
Funded	96,295	58,823	10,922	735	0	0	0	166,775
Unfunded	0	23,253	38,973	5,000	0	0	0	67,226
Facilities, Station & Access								
Funded	24,309	31,435	12,786	0	0	0	33,788	102,318
Unfunded	0	270	9,256	9,553	3,000	4,000	111,935	138,014
Facilities, Support								
Funded	0	77	0	0	0	0	0	77
Unfunded	300	541	0	0	0	0	0	841
Train Control								
Funded	29,165	18,208	6,674	765	0	0	0	54,812
Unfunded	0	0	0	0	0	0	0	0
AFC & Communication								
Funded	4,023	1,239	472	0	0	0	0	5,734
Unfunded	0	1,990	0	0	0	0	0	1,990
Electrification								
Funded	1,751	3,322	4,268	0	0	0	0	9,341
Unfunded	0	756	1,210	0	0	0	0	1,966
Procurements								
Funded	0	1,873	0	307	0	0	0	2,180
Unfunded	0	0	5,103	200	0	0	0	5,303
Other Categories								
Funded	21,753	25,819	24,751	9,318	11,172	17,309	5,789	115,911
Unfunded	0	0	0	0	0	0	0	0
ALL CATEGORIES								
Funded	213,446	245,885	152,371	19,649	11,172	17,309	39,577	699,409
Unfunded	300	26,810	54,542	14,753	3,000	4,000	111,935	215,340
GRAND TOTAL	**213,746**	**272,695**	**206,913**	**34,402**	**14,172**	**21,309**	**151,512**	**914,749**

* Prior Years Expenditures on Active Projects

Figure H

FIVE-YEAR CAPITAL PROGRAM SUMMARY

Sources, Cash Flow Basis

(000)

	Prior* Years	Budgeted FY 87/88	Projected FY 88/89	Projected FY 89/90	Projected FY 90/91	Projected FY 91/92	Projected Within 5 Year	Cumulative Total
UMTA Funds								
Funded	106,982	110,234	66,536	7,118	0	0	0	290,870
Unfunded	0	1,231	9,727	160	800	3,200	78,794	93,912
State Funds								
Funded	18,260	19,548	13,762	1,454	0	0	0	53,024
Unfunded	0	4,983	7,517	0	0	0	0	12,500
Regional Funds								
Funded	10,723	5,525	2,249	383	0	0	0	18,880
Unfunded	0	2,572	4,919	40	200	800	19,698	28,229
BARTD Funds								
Funded	77,481	110,578	69,824	10,694	11,172	17,309	39,577	336,635
Unfunded	300	18,024	32,379	14,553	2,000	0	13,443	80,699
ALL SOURCES								
Funded	213,446	245,885	152,371	19,649	11,172	17,309	39,577	699,409
Unfunded	300	26,810	54,542	14,753	3,000	4,000	111,935	215,340
GRAND TOTAL	**213,746**	**272,695**	**206,913**	**34,402**	**14,172**	**21,309**	**151,512**	**914,749**

* Prior Years Expenditures on Active Projects

INTRODUCTION

BART BACKGROUND AND FIVE YEAR PLAN PURPOSE

The BART District was formed in 1957 by the State Legislature in response to Bay Area growth forecasts and related future transportation needs. A variety of unanticipated problems emerged following the start up of revenue operations which began in September 1972. Since that time, efforts have been directed toward improving system reliability and increasing capacity, the result of which has been significantly improved train service.

BART's 1987 Five Year Plan presents a strategy for continued progress for achieving a greater share of the system's potential for serving Bay Area travel needs. The plan is the result of an ongoing process involving the District Board of Directors and management for the purpose of identifying future capital and financial requirements.

The document is divided into two separately bound volumes. These are: the Operations and Service Plan and the Capital Improvement Program. The Operations and Service volume identifies key issues and assumptions either carried over from the previous planning cycle or those which have more recently emerged. These concerns are then incorporated into an evaluation of system performance and service improvements section of Volume I. The District's key performance indicators and policy framework provide the structure for this discussion. The final section of Volume I presents the District's financial strategy for supporting planned operations and service. The details pertaining to the capital projects required for the delivery of planned service are provided in Volume II: Capital Improvement Plan. Capital budget requirements and projected funding availability by source are presented along with additional details for selected capacity expansion, station access, and extension projects.

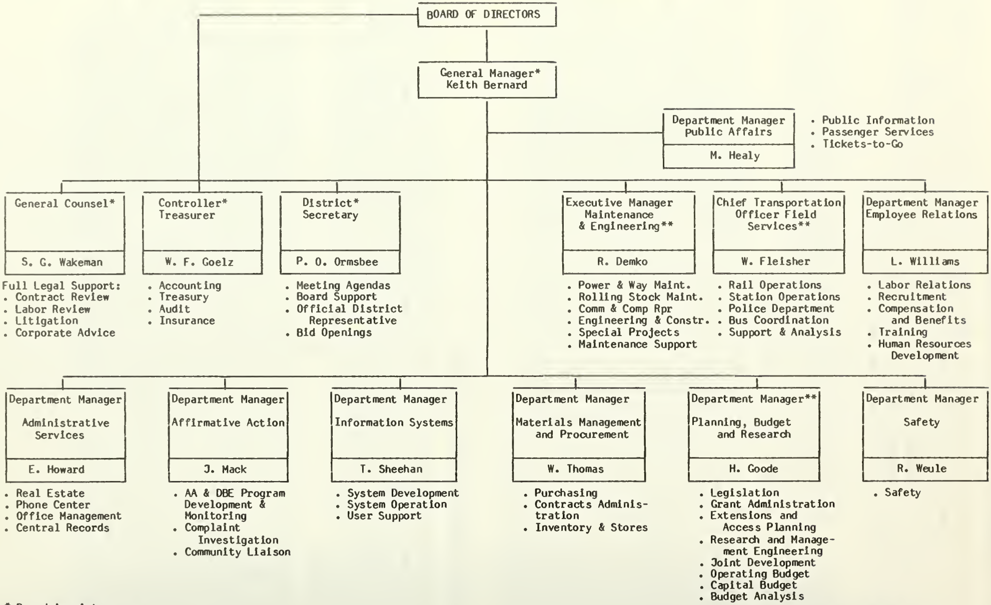
DISTRICT ORGANIZATIONAL OVERVIEW

Current BART organization reflects a management structure which has evolved to effectively carry out District programs and policies. As shown in Figure 1, thirteen department managers report directly to the General Manager who in turn reports to a nine-member elected Board. As Board appointed officers, three of the department managers also report directly to the Board of Directors. These are the General Counsel, Controller/Treasurer, and District Secretary.

As the legislative body of the District, the Board of Directors establishes BART policy. In accordance with BART's mission statement, the Board of Directors reviews and adopts a set of goals and objectives each year reflecting District needs which have been grouped into nine program areas (see Figure 2 for the mission statement and goals and Figures 41 and 42 in Chapter II for objectives). This process is part of the annual budget and five-year planning cycle, and serves to guide management in budgeting for and organizing BART's labor force (consisting of approximately 2,250 employees) so that desired levels of performance may be achieved. Additionally, progress towards implementing important programs and capital improvements is continually monitored and reviewed. Other projects continue to be identified as part of this process in an effort to improve BART's effectiveness and operating performance even further. The Project Review Board, composed of key

Figure 1

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT



* Board Appointee
**Project Review Board

Figure 2

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT POLICY

PREAMBLE TO DISTRICT GOALS AND OBJECTIVES

Based on the 1957 BART Commission Report, the statutes that created BART, the 1962 Composite Report, and principles of prudent business management, it is the policy of the San Francisco Bay Area Rapid Transit District to:

1. Maximize the effectiveness and efficiency of its operations and bring the system to its full potential.
2. Maximize the return on its investments in property, rights-of-way, and facilities.
3. Expand its service area to become the operator of an integrated regional trunk-line transit system which effectively serves interested counties in the Bay Area.

DISTRICT GOALS

1. Operate scheduled 4-route weekday service with route headways of 15 minutes or less during peak and midday periods and expand service within feasible, technical, and financial limits including improved peak-hour frequency of service and capacity where needed.
2. Improve the reliability performance of the present BART system.
3. Continue to improve BART system and patron safety and emergency preparedness.
4. Increase system utilization by promoting BART travel for all purposes with special emphasis on offpeak and reverse commute trips.
5. Fund and implement the necessary capital improvements and replacements to the system.
6. Operate within available funds without incurring an unfunded deficit.
7. Maximize the contribution to operating costs from passenger revenues, consistent with reasonable fare levels, to achieve a farebox ratio above 50%.
8. Make every effort to achieve District objectives for female and minority employment and minority business enterprise participation.
9. Improve system access by means of a comprehensive program of parking expansion, BART feeder services, transit coordination, and special projects addressing elderly and handicapped mobility.
10. Develop station area sites for the realization of increased patronage and revenues, and to enhance the communities BART serves.
11. Extend BART trunk lines within Bay Area travel corridors where feasible and in support of regional land use policies.

department managers, plays an important role in this process by recommending to the General Manager project priorities based on staff analysis and evaluation of District needs. Prior to project implementation, required State and Federal environmental reviews are completed and specific Board project and project funding approval are obtained.

CURRENT SYSTEM AND SERVICE OVERVIEW

The BART rail system contains 34 stations, 9 of which are in the Westbay and 25 in the Eastbay. Trains operate over 3 Transbay and 1 Eastbay routes on a total of 71 miles of double mainline track. Trains are formed and dispatched from three maintenance yards located in the Eastbay. The central train control computer at the Lake Merritt Administration Building maintains overall supervision of train movements. (Additional system description and service information is provided in "BART FACTS" located on the inside front and back covers.)

Trains can travel up to 80 miles per hour. Normal operations are based on a 72 mile per hour maximum which results in an average system speed of 32.7 miles per hour including station stops. Regular adult fares and travel times for the rail system are presented below.

The components of BART's fare structure are summarized in Figure 3.

Fares

	Balboa Park	Glen Park	24th St. Mission	16th St Mission	Civic Center	Powell	Montgomery	Embarcadero	Oakland West	Concord	Pleasant Hill	Walnut Creek	Lafayette	Orinda	Rockridge	Richmond	El Cerrito Del Norte	El Cerrito Plaza	North Berkeley	Berkeley	Ashby	MacArthur	19th St. Oakland	Oak City Ctr. 12th St.	Lake Merritt	Fruitvale	Coliseum	San Leandro	Bay Fair	Hayward	South Hayward	Union City	Fremont
Daly City	1.30	1.30	1.30	1.30	1.45	1.45	1.45	1.45	1.85	2.85	2.70	2.60	2.45	2.25	2.00	2.35	2.25	2.15	2.10	2.05	2.00	1.95	1.90	1.90	1.90	2.05	2.15	2.25	2.35	2.50	2.65	2.85	3.00
Balboa Park		0.80	0.80	0.80	0.80	0.80	0.80	0.80	1.75	2.80	2.60	2.55	2.40	2.20	1.95	2.30	2.20	2.10	2.00	2.00	1.95	1.90	1.85	1.85	1.85	2.00	2.05	2.20	2.30	2.45	2.60	2.80	2.95
Glen Park			0.80	0.80	0.80	0.80	0.80	0.80	1.70	2.80	2.60	2.50	2.35	2.15	1.90	2.25	2.15	2.10	2.00	1.95	1.90	1.85	1.80	1.80	1.80	1.95	2.05	2.15	2.30	2.40	2.55	2.75	2.95
24th St. Mission				0.80	0.80	0.80	0.80	0.80	1.55	2.70	2.50	2.45	2.30	2.10	1.85	2.20	2.10	2.00	1.90	1.90	1.85	1.75	1.65	1.65	1.65	1.85	1.95	2.10	2.20	2.35	2.50	2.70	2.85
16th St Mission					0.80	0.80	0.80	0.80	1.55	2.70	2.50	2.45	2.25	2.10	1.80	2.15	2.05	2.00	1.90	1.85	1.80	1.70	1.60	1.60	1.60	1.80	1.95	2.10	2.20	2.30	2.45	2.70	2.85
Civic Center						0.80	0.80	0.80	1.40	2.65	2.45	2.40	2.25	2.05	1.75	2.10	2.00	1.95	1.85	1.80	1.75	1.60	1.55	1.55	1.55	1.75	1.90	2.05	2.15	2.30	2.40	2.65	2.80
Powell							0.80	0.80	1.40	2.65	2.45	2.40	2.25	2.05	1.75	2.10	2.00	1.95	1.85	1.80	1.75	1.60	1.55	1.55	1.55	1.75	1.90	2.05	2.15	2.30	2.40	2.65	2.80
Montgomery								0.80	1.40	2.65	2.45	2.40	2.25	2.05	1.75	2.10	2.00	1.95	1.85	1.80	1.75	1.60	1.55	1.55	1.55	1.75	1.90	2.05	2.15	2.30	2.40	2.65	2.80
Embarcadero									1.40	2.65	2.45	2.40	2.25	2.05	1.75	2.10	2.00	1.95	1.85	1.80	1.75	1.60	1.55	1.55	1.55	1.75	1.90	2.05	2.15	2.30	2.40	2.65	2.80
Oakland West										1.90	1.70	1.65	1.45	1.15	0.80	1.35	1.20	1.10	0.95	0.85	0.80	0.80	0.80	0.80	0.80	0.80	0.95	1.15	1.35	1.50	1.65	1.90	2.05
Concord											0.80	0.80	0.80	0.80	1.75	2.10	2.00	1.95	1.85	1.85	1.80	1.80	1.85	1.85	1.85	1.90	2.00	2.15	2.25	2.35	2.50	2.75	2.90
Pleasant Hill												0.80	0.80	0.80	1.55	1.95	1.85	1.75	1.65	1.65	1.60	1.60	1.65	1.65	1.65	1.70	1.80	1.95	2.05	2.20	2.30	2.55	2.70
Walnut Creek													0.80	0.80	1.40	1.85	1.75	1.70	1.60	1.55	1.55	1.55	1.55	1.55	1.55	1.65	1.75	1.85	2.00	2.10	2.25	2.45	2.65
Lafayette														0.80	1.15	1.70	1.60	1.50	1.45	1.40	1.30	1.25	1.35	1.35	1.35	1.50	1.55	1.70	1.80	1.95	2.10	2.30	2.45
Orinda															0.80	1.50	1.40	1.30	1.15	1.10	1.00	0.80	1.05	1.05	1.05	1.20	1.40	1.55	1.65	1.75	1.90	2.15	2.30
Rockridge																1.20	1.05	0.90	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.85	1.00	1.20	1.40	1.55	1.65	1.90	2.05
Richmond																	0.80	0.80	0.80	0.80	0.80	1.20	1.30	1.30	1.30	1.45	1.55	1.65	1.80	1.90	2.05	2.30	2.45
El Cerrito Del Norte																		0.80	0.80	0.80	0.80	1.00	1.10	1.10	1.10	1.35	1.45	1.60	1.70	1.80	1.95	2.20	2.35
El Cerrito Plaza																			0.80	0.80	0.80	0.90	1.00	1.00	1.00	1.20	1.35	1.50	1.60	1.75	1.90	2.10	2.25
North Berkeley																				0.80	0.80	0.80	0.80	0.80	0.80	1.05	1.20	1.40	1.50	1.65	1.80	2.00	2.15
Berkeley																					0.80	0.80	0.80	0.80	0.80	1.00	1.15	1.35	1.50	1.65	1.75	2.00	2.15
Ashby																						0.80	0.80	0.80	0.80	0.90	1.05	1.30	1.45	1.60	1.75	1.95	2.10
MacArthur																							0.80	0.80	0.80	0.80	0.95	1.20	1.35	1.55	1.65	1.90	2.05
19th St. Oakland																								0.80	0.80	0.80	0.80	1.10	1.25	1.50	1.60	1.85	2.00
Oak City Ctr. 12th St.																									0.80	0.80	0.80	1.10	1.25	1.50	1.60	1.85	2.00
Lake Merritt																										0.80	0.80	1.10	1.25	1.50	1.60	1.85	2.00
Fruitvale																											0.80	0.80	1.05	1.25	1.50	1.70	1.90
Coliseum																												0.80	0.80	1.10	1.35	1.65	1.80
San Leandro																													0.80	0.80	1.10	1.45	1.65
Bay Fair																														0.80	0.80	0.80	0.80
Hayward																															0.80	0.80	0.80
South Hayward																																0.80	0.80
Union City																																	0.80

Time

	Daly City	Balboa Park	Glen Park	24th St. Mission	16th St Mission	Civic Center	Powell	Montgomery	Embarcadero	Oakland West	Concord	Pleasant Hill	Walnut Creek	Lafayette	Orinda	Rockridge	Richmond	El Cerrito Del Norte	El Cerrito Plaza	North Berkeley	Berkeley	Ashby	MacArthur	19th St. Oakland	Oak City Ctr. 12th St.	Lake Merritt	Fruitvale	Coliseum	San Leandro	Bay Fair	Hayward	South Hayward	Union City
Balboa Park	5																															
Glen Park	7	3																														
24th St. Mission	10	6	4																													
16th St Mission	13	8	6	3																												
Civic Center	15	11	9	5	3																											
Powell	17	13	10	7	5	2																										
Montgomery	19	15	12	9	7	4	2																									
Embarcadero	21	16	14	11	8	6	4	2																								
Oakland West	28	24	21	18	16	13	11	10	8																							
Concord	68	63	61	57	55	53	51	49	47	40																						
Pleasant Hill	62	57	54	51	49	46	45	43	41	34	7																					
Walnut Creek	58	54	51	48	46	43	41	40	38	30	10	4																				
Lafayette	53	49	46	43	41	38	36	35	33	25	15	9	6																			
Orinda	48	43	41	37	35	33	31	29	27	20	21	14	11	6																		
Rockridge	41	37	34	31	29	26	25	23	21	14	27	21	17	12	7																	
Richmond	59	55	52	48	46	43	41	40	38	30	51	45	42	37	31	25																
El Cerrito Del Norte	55	50	47	44	42	39	37	35	34	26	47	41	38	33	27	21	5															
El Cerrito Plaza	51	47	44	41	38	36	34	32	30	23	44	38	35	30	24	18	8	4														
North Berkeley	48	43	40	37	35	32	30	28	27	19	40	34	31	26	20	14	12	7	4													
Berkeley	45	40	38	34	32	29	27	26	24	16	37	31	28	23	17	11	15	10	7	3												
Ashby	42	38	35	31	29	26	25	23	21	13	34	28	25	20	14	8	17	13	10	6	3											
MacArthur	38	34	31	28	26	23	21	19	18	10	30	24	21	16	10	4	21	17	14	10	7	4										
19th St. Oakland	34	30	27	24	22	19	17	16	14	7	34	28	25	20	14	8	25	20	17	13	11	8	4									
Oak City Ctr. 12th St.	32	28	26	22	20	18	16	14	12	5	36	29	26	21	16	9	26	22	19	15	12	10	6	2								
Lake Merritt	33	29	26	23	21	18	16	15	13	5	39	33	30	25	19	12	30	25	22	18	16	13	9	6	4							
Fruitvale	38	34	31	28	26	23	21	19	18	10	43	37	34	29	23	17	34	30	26	23	20	17	13	10	8	5						
Coliseum	42	37	35	31	29	27	25	23	21	14	47	41	38	33	27	20	37	33	30	26	23	20	17	13	11	8	4					
San Leandro	46	41	39	35	33	31	29	27	25	18	51	45	42	37	31	24	42	37	34	30	28	25	21	17	16	12	8	5				
Bay Fair	50	45	43	40	37	35	33	31	30	22	55	49	46	41	35	29	46	41	38	34	32	29	25	21	20	16	12	9	5			
Hayward	55	50	47	44	42	40	38	36	34	27	59	53	50	45	39	33	50	46	42	39	36	33	29	26	24	21	16	13	9	5		
South Hayward	59	54	52	48	46	44	42	40	38	31	63	57	54	49	44	38	54	50	47	43	40	37	33	30	29	25	21	17	13	9	5	
Union City	64	59	57	54	52	49	47	46	44	36	69	63	60	55	49	43	60	55	52	48	45	43	39	35	34	30	26	23	18	14	10	6
Fremont	69	65	62	59	56	54	52	50	49	41	74	68	65	60	54	46	64	60	57	53	50	47	44	40	38	35	31	27	23	19	15	11	5

Figure 3

BART FARE COMPONENTS AND TICKET PRICES

TRIP LENGTH:	Up to 6 Miles	$0.80	
	Between 6 and 14 Miles[1]	$0.92 + 0.069/Mile	
	Over 14 Miles	$1.47 + 0.041/Mile	
SURCHARGE:	Transbay	$0.45	
	Daly City[2]	$0.52	
SPEED PREMIUM:	Extra Charge for Faster (or fare reduction for slower) Than Average Trips; Based on Scheduled Travel Time	+/- $0.025/Minute	
RESULTING FARES:[3]	Range	$0.80 to $3.00	
	Average[4]	$1.69	
SPECIAL FARES:[5] **& DISCOUNTED TICKETS:**	Children Under 5 (No Charge)	$0.00	
	Children 5 through 12 (90% Discount)	$1.60	($16.00 Value)
	Persons 65 and Over (90% Discount)	$1.60	($16.00 Value)
	Qualifying Handicapped (90% Discount)	$1.60	($16.00 Value)
	Regular Adult (6.25% Discount)	$30.00	($32.00 Value)
	Excursion (Entry/Exit, Same Station)	$2.60	
SEMIMONTHLY PASS:[6]	BART Ticket Combined with AC Transit Semimonthly Pass (unlimited AC use)	8 denominations from $20.00 to $53.00	
MONTHLY PASS:[7]	Unlimited Monthly BART/MUNI Travel Within San Francisco	$23.00	
EXPRESS BUS: (1 Zone/2 Zone)	Children Under 5 (No Charge)	$0.00	
	Children 5 through 12	$0.15/$0.30	
	Regular Adult	$0.75/$1.15	
	Persons 65 and Over	$0.15/$0.30	
	Qualifying Handicapped	$0.15/$0.30	
TRANSFERS:[9]	BART Express Bus (Leaving Rail Station)	$0.75 Value	
	SF MUNI (Per MUNI Round Trip)	$0.75 Value	
	AC Transit (Per AC Round Trip) -- Peak[8]	$0.50 Value	
	Off-Peak	$0.90 Value	
	CCC Transit Authority (Leaving Rail Station)	$0.35 Value	

NOTES:

1. Trips over 6 miles within Eastbay Suburban Zone (Concord-Orinda, Fremont-Bayfair, Richmond-Ashby) priced at fare indicated for trips under 6 miles.
2. Does not apply to Transbay trips.
3. Resulting fares are rounded to nearest 5¢ and encoded in Automatic Fare Collection equipment.
4. Weighted by all BART-ticketed trips (excludes BART/MUNI pass trips) which average 13.9 miles.
5. Discounted multiple-ride tickets are sold at off-site BART ticket outlets and are not available in stations.
6. Includes last ride bonus feature on BART which allows any trip if remaining balance equals 5¢. Demonstration program effective February 1987.
7. The BART/MUNI Fast Pass is available at all San Francisco MUNI pass outlets.
8. Weekdays 6 - 9 a.m. and 4 - 7 p.m.
9. In addition to those shown, transfers are also available for transit services which connect with BART but operate primarily outside the three-county BART District.

CHAPTER I

PLANNING ISSUES

The issues identified in last year's Five Year Plan will continue to figure prominently in District planning considerations for the foreseeable future. These are:

- Future Demand Projections
- New Peak Service Capacity
- Service Quality
- Cost Effectiveness and Productivity
- Program Delivery
- System Extensions
- Maintenance Requirements
- Express Bus Effectiveness and Productivity
- Energy Contingency Requirements
- Capital Investment Planning
- Privatization
- Disadvantaged Business Enterprise
- Comprehensive Marketing
- Five Year Planning Process

In the following sections of this chapter, each of these issues will be reexamined in terms of the latest available projections, assumptions, or related information. Based on this discussion, the plan will focus in the next chapter on an assessment of District performance.

FUTURE DEMAND PROJECTIONS

Expectations regarding future ridership levels are perhaps the key consideration in short- and long-range transit planning. Additional emphasis is given to anticipated peak period riding as the determinant of maximum system capacity requirements. Route-by-route growth patterns will influence the distribution of available capacity, and underscore the need for capital improvements. Patronage projections affect staffing and other resource allocation, especially for vehicle maintenance and power requirements. Taken together with estimates of available financial assistance, annual ridership and revenue projections largely determine future expenditure limits. Future demand assessment is, therefore, the starting point in the Five Year Plan process.

What is the outlook for growth of BART patronage during the 1987-1992 planning period? This section provides a review of recent trends, a brief discussion of factors influencing those trends including likely future changes, and a summary of the updated five-year demand forecast.

Recent Trends in BART Ridership*

BART patronage grew steadily between 1981 and mid-1985, except for a temporary decline after the fare increase in September 1982 (Figure 4). Between the winter of 1982-83 and late 1984, it grew at an annual rate of about 9%. From

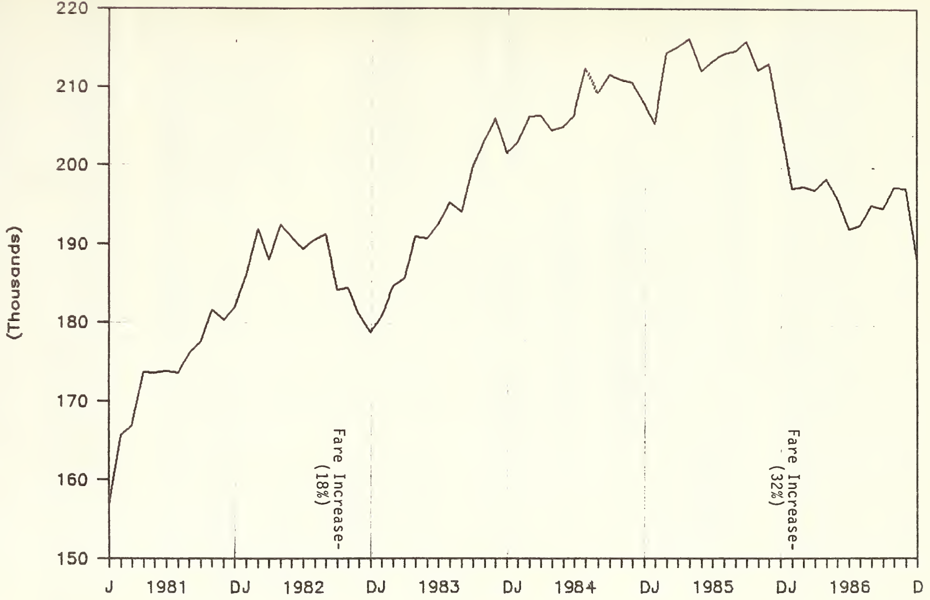
---

*This section is drawn from a more detailed report, "BART Patronage Study," February 1987.

FIGURE 4

AVERAGE WEEKDAY PATRONAGE

(1981 - 1986)



late 1984, the rate of growth continued at a 4% annual rate until April 1985, when it reached an all-time high of 216,155. It then declined slightly through the fall of 1985.

Patronage decreased sharply following the fare increase in January 1986. Between Fall 1985 and Spring 1986, average weekday patronage decreased by 8%. What distinguishes patronage trends following this fare increase from those of previous fare increases is the longer amount of time for growth to resume. Although patronage appears to be recovering by late 1986, it remains almost 8% below its level of Fall 1985, nearly one year after the fare increase.

BART's experience is typical of other major transit operators in California (Figure 5). Most other operators have had fare increases, with resulting decreases in patronage.

Figure 5

PATRONAGE CHANGES FOR SELECTED CALIFORNIA TRANSIT OPERATORS

Patronage Change (%)
(March-April of each year)

	1984-85	1985-86	85/86 FARE CHANGES
AC Transit	-4.5%	-0.1%	Transbay fare increase
Caltrain	2.6	3.4	
Golden Gate Transit	-13.3*	0.1	*10-15% fare increase 20-30% local fare decrease
San Mateo Transit	1.4	-6.8	40% fare increase
Santa Clara Transit	-1.6	-2.7	
Sacramento Regional Transit	0.6	-7.7	33-40% fare increase
Southern California Rapid Transit	6.8	-11.7	70% fare increase
BART	4.4	-8.5	32% fare increase

The greatest decreases in patronage since Spring 1985 have occurred during the peak periods. Between Spring 1985 and Spring 1986, peak patronage declined by 11% and off-peak by 6%.* The peak accounted for 67% of the patronage, but 83% of the decrease was during the peak.

---

*For purposes of this study, the peak is defined as 6 to 10 a.m. and 4 to 7 p.m.

As shown in Figure 6, peak patronage began to decline in the latter half of 1985 before the fare increase. Much more significant reductions followed the change in fares. As indicated below, however, other factors besides the fare increase seem to have caused this erosion of peak ridership.

Off-peak patronage was growing at a greater rate than peak patronage before the fare increase. This trend appears to have continued after the change in fares; as indicated in Figure 6, off-peak travel did not decline as much as did that of the peak.

The largest decrease in BART patronage has been in travel to and from San Francisco. For these trips, the percentage decreases were generally larger from areas with larger initial patronage. The largest declines are associated with the longer trips, where the proportional increase in fares was the largest. The greatest single decrease was in trips between the eastern part of the Concord line and downtown San Francisco (down 14%). Large decreases were also observed from Daly City (14%) and southern Alameda county (10%). These areas together account for 40% of the total decrease in peak trips.

Changes in peak travel to and from downtown San Francisco are shown graphically in Figures 7 and 8, for nine major markets comprising Daly City and East Bay stations. It should be noted that, for most of these areas, since Spring 1985 the rate of decrease in the AM peak period is greater than that in the PM peak, indicating an imbalance in use of BART for only the evening commute direction. The imbalance is the greatest for the Contra Costa Central area (Orinda and Lafayette stations), where casual carpooling has been observed to increase over the past year.

After fares were raised in January 1986, average weekday ridership declined until June 1986 (see Figure 9). Since then, the trend has reversed and patronage has moved generally upwards through the end of 1986, if December figures are adjusted for the traditionally lower riding during the holiday period. Travel in January 1987 reflects a normal seasonal reduction. By the end of February 1987, BART ridership had begun to exceed 200,000 trips per weekday.

Causes of Patronage Changes

According to the "BART Patronage Study", sources of patronage change were reduced service quality before the fare increase and the fare increase itself. In addition, the decrease in ridership over this period may have been impacted by lower gasoline prices and movement of jobs from San Francisco to suburban areas. A summary of the estimated sources of change in patronage is given in Figure 10.

Patronage in the peak period had been limited by capacity on the three Transbay lines. The work on the KE track during the summer and fall of 1985 delayed service, causing reduced throughput in the Transbay tube. The number of train delay events increased sharply beginning the first quarter of FY 1986 (July - September 1985), and the percentage patron-on-time measure decreased (Figure 11). The Transbay market was most affected by level of service reductions, accounting for 70% of the decrease in patronage between Spring and Fall 1985.

FIGURE 6

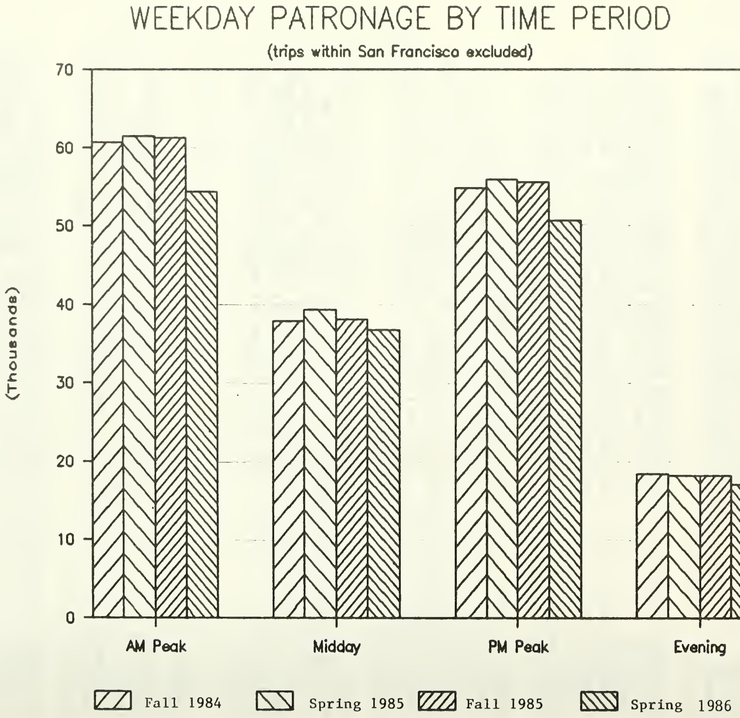

WEEKDAY PATRONAGE BY TIME PERIOD
(trips within San Francisco excluded)
(Thousands)
70
60
50
40
30
20
10
0
AM Peak
Midday
PM Peak
Evening
Fall 1984
Spring 1985
Fall 1985
Spring 1986

FIGURE 7

AM PEAK TRIPS TO SF CBD

(by major market area)

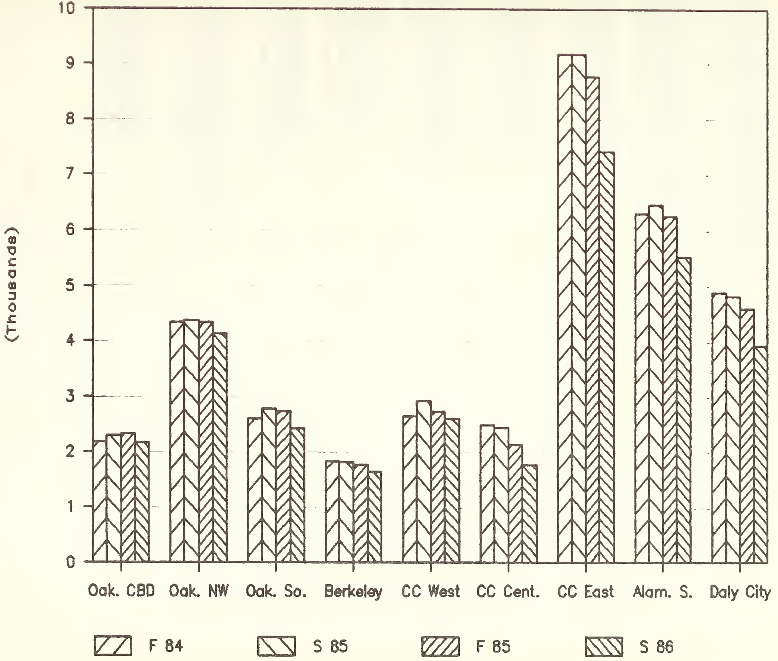


FIGURE 8

PM PEAK TRIPS FROM SF CBD

(by major market area)

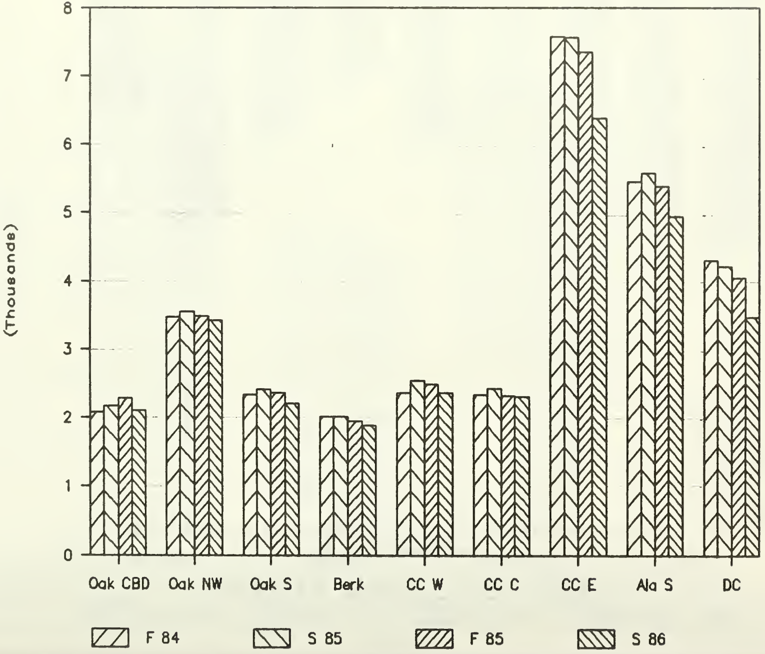


FIGURE 9

AVERAGE WEEKDAY PATRONAGE

(January – February 1987)

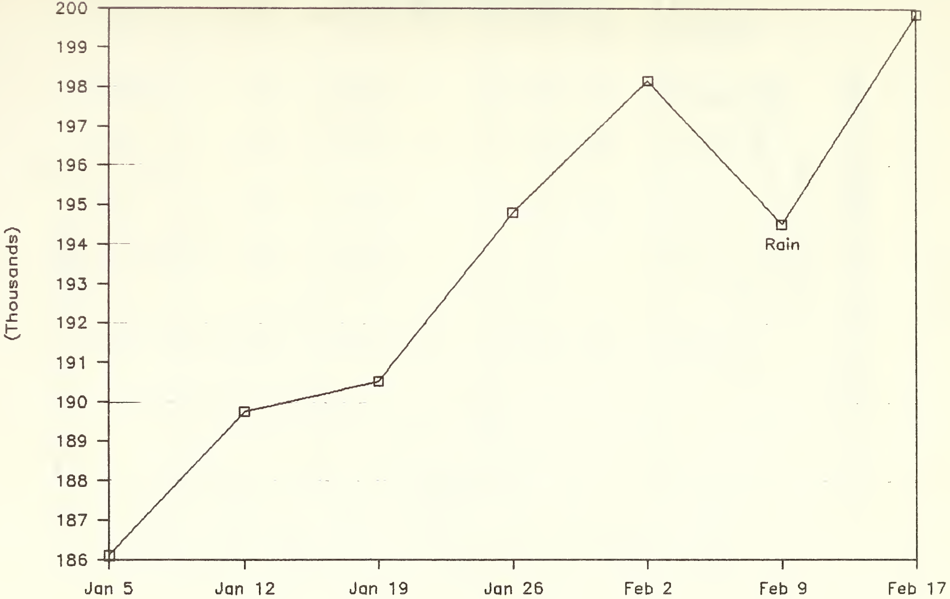


Figure 10

SOURCES OF CHANGE IN BART WEEKDAY PATRONAGE BY MARKET
(Spring 1985 to Spring 1986)

(Thousands of trips)

	Transbay	San Francisco Internal	Daly City	Oakland CBD	Other East Bay	TOTAL
Spring 1985	107.1	40.4	14.6	22.4	31.0	215.4
Spring 1986	98.1	38.3	12.0	19.8	29.0	197.3
Total change	-9.0	-2.1	-2.5	-2.5	-2.0	-18.1
	-8.4%	-5.2%	-17.5%	-11.4%	-6.3%	-8.4%
CHANGE						
Peak*	-7.9		-1.9	-1.3	-1.2	-12.3*
	-10.7%		-17.8%	-9.2%	-6.7%	-10.5%
Off peak*	-1.1		-0.7	-1.2	-0.7	-3.7*
	-1.0%		-16.5%	-15.5%	-5.7%	-6.4%
Total change	-9.0	-2.1	-2.5	-2.5	-2.0	-18.1
% of change in peak	88.3%		73.2%	52.6%	63.0%	77.1%*
FARE INCREASE						
Rideshare/ fare evasion	-1.7	--	--	--	--	-1.7
	-1.6%					-0.8%
Other	-4.4	-2.2	-2.0	-2.1	-3.2	-13.9
	-4.1%	-5.3%	-13.8%	-9.4%	-10.2%	-6.4%
Subtotal	-6.2	-2.2	-2.0	-2.1	-3.2	-15.6
	-5.8%	-5.3%	-13.8%	-9.4%	-10.2%	-7.2%
OTHER						
Service	-0.4	0.0	-0.5	-0.4	0.0	-1.3
	-0.4%	0.0%	-3.7%	-1.9%	0.0%	-0.6%
Rideshare	-0.9	--	--	--	--	-0.9
	-0.8%					-0.4%
Job relocation	-1.5	Not known		--	--	-1.5
	-1.4%					-0.7%
Other	--	--	--	--	1.2	1.2
					3.9%	0.6%
Subtotal	-2.8	0.0	-0.5	-0.4	1.2	-2.5
	-2.6%	0.1%	-3.7%	-1.9%	3.9%	-1.2%

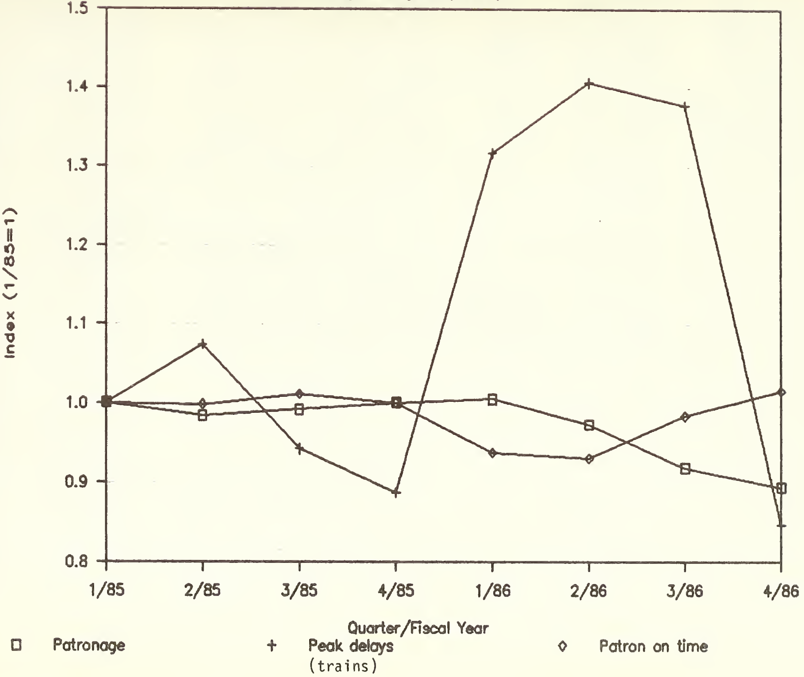
---

*San Francisco internal trips excluded.

FIGURE 11

SERVICE DELAYS AND PATRONAGE

(by fiscal year quarter)



Much of the decrease in patronage since Spring 1985 can be attributed to the fare increase. The aggregate fare elasticity is about -0.29, which is consistent with transit experience in the U.S.* What is startling is that the elasticity during the peak (-0.35) is markedly greater than during the off-peak (-0.17).** This may be due in part to increased sensitivity to fare increases on the part of peak passengers, some of whom have had to stand. The association between greater elasticities and greater travel distances lends support to this view. BART's peak riders also have higher incomes, and greater access to automobiles than most other transit riders. Furthermore, the reaction to a fare increase may have been greater now than in 1982 in part because the inflation rate is now much lower than it was then.

One reason why patronage has taken longer to recover from the fare increase than it has in the past may be that the fare increase occurred later in the fiscal year than previous fare increases. The summer vacation period may have interrupted any turnaround. Recovery was also hindered by a large decrease in gasoline prices immediately following the fare increase (Figure 12). An earlier decline in gasoline prices, however, does not seem to have had a significant effect on patronage.

There has been a large apparent increase in the use of BART by commuters for only the return trip in the evening peak. Casual carpooling (or other ridesharing) is one likely explanation for this effect. There also appears to be some increase in fare evasion since the fare increase.

The large amount of development in Contra Costa and Alameda Counties has resulted in a number of jobs being relocated from the San Francisco CBD. It is difficult to estimate the effect on BART patronage because of limited information on the timing and source of shifts. The San Francisco Department of Housing and Economic Development has estimated that between 1984 and 1986, about 14,000 to 16,000 jobs have left San Francisco; much of this movement has taken place since the summer of 1985. About 35% of the workers in the San Francisco CBD come from the East Bay; about one-third of these use BART. If these percentages apply similarly to BART commuters to San Francisco, and if half of this decrease occurred between Spring 1985 and Spring 1986, about 1,000 to 2,000 trips per day may have been lost since the summer of 1985 due to job movement out of San Francisco. Relocation of jobs to the East Bay may have caused some increase in commuting opposite to the peak direction. But the patronage data show only a small increase in reverse direction travel during the peak.

---

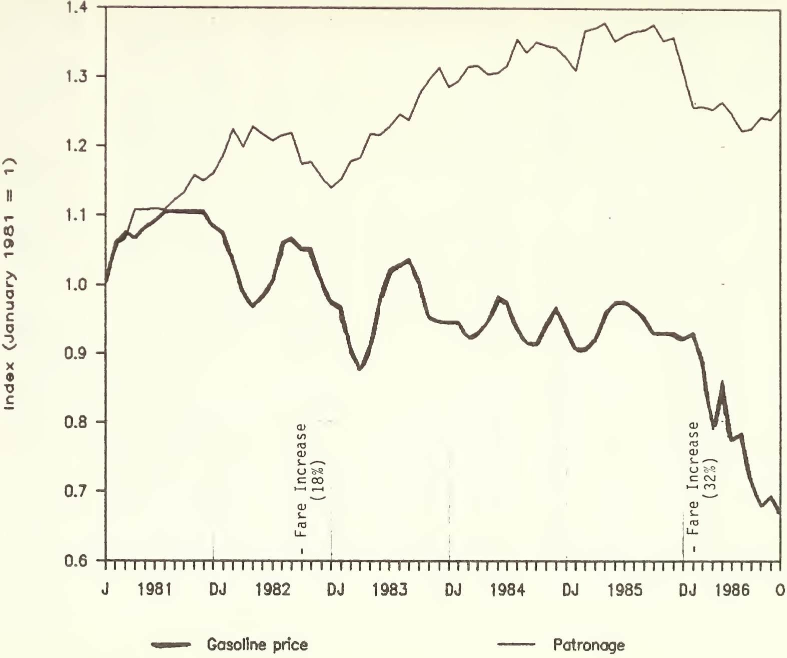
*Transit fare elasticity is defined as the marginal percentage change in demand per percentage change in fare. A market with an elasticity between 0 and -1 is called *inelastic*, while if the elasticity is lower than -1 it is called *elastic*. Transit markets are almost always inelastic with respect to fares. If a market is inelastic, an increase in price will bring about an increase in revenue, and a decrease in price will cause revenue to decrease.

**The peak fare elasticity is -0.35±0.03, and the aggregate fare elasticity is -0.29±0.02; the variation is due to uncertainty in the estimate of patronage loss because of job movement out of downtown San Francisco.

FIGURE 12

GASOLINE PRICES AND PATRONAGE

(January 1981 – October 1986)



Peak fare elasticities appear to increase as the percentage change in fare increases. This is contrary to standard transit patronage estimation procedures in which constant fare elasticities are assumed. This finding indicates that to minimize the effects of fare changes on patronage, it may be preferable to raise fares in more frequent, smaller increments rather than less frequent, larger increments.

Outlook for Future BART Patronage Growth

Demand for BART during the upcoming five-year period is likely to be influenced by the following external factors over which the District has no control:

- Regional growth, especially of employment in San Francisco,
- Changes in service levels and capacity of the regional highway network, especially in corridors parallel to BART,
- Changes in costs associated with commuting by modes other than BART, especially for auto parking and gasoline.

In addition, BART can influence the level of ridership using the system by:

- Adding to peak period capacity,
- Maintaining service quality, especially during peak periods,
- Developing a more comprehensive marketing approach to service planning and delivery.

The outlook for future BART ridership during the 1987-1992 planning period is assessed briefly in terms of each of these factors.

The regional growth trend of most significance to BART demand projections is the growth of employment in the San Francisco and Oakland CBDs, given that BART is radially aligned and most competitive for peak work trips to central locations. According to projections compiled by the Association of Bay Area Governments, employment in San Francisco is expected to grow by about 1% annually during the planning period. This rate is the minimum by which peak period demand is expected to grow.

Growth in employment in suburban locations is less likely to create demand for BART because of its lack of concentration in BART corridors and the greater competitiveness of the automobile in serving this market. However, as shown after the recent fare increase, growth in reverse commuting is a strong, if small component of BART peak period travel. Likewise, although the auto is more competitive in this market, most new large suburban developments are actively promoting transit access because of the potential for significant traffic congestion problems.

The existing system of regional highways is at or near capacity on many of the segments which parallel the BART system. It was in recognition of this condition that voters in Alameda County recently approved Measure B which will fund a number of highway and transit improvements over the next 15 years. (A similar measure was defeated in Contra Costa County.) Although this program will provide increased peak period freeway capacity in the long-run, its short-run effect may be to decrease the service level and thus the capacity of these highway segments during the construction period. This factor is likely to increase the effective rate of growth in work trips above the rate noted above for growth of jobs in San Francisco. For this reason, during the latter four years of the upcoming forecast period, it is assumed that Transbay peak demand will grow by at least 2.7% annually. (This is the equivalent of assuming that BART, with a 37% share of peak period Transbay travel, effectively attracts all new peak growth in the corridor).

Costs of commuting by other modes are not expected to diminish relative to BART fares. Although gasoline price changes do not appear to have been closely correlated with past BART ridership changes (see Figure 12 above), it is likely that the long-run gasoline price level will rise relative to BART fares, thus contributing to greater demand for BART. CBD parking charges are probably a more significant cost factor in the decision to ride BART; the updated forecast assumes that parking costs will not diminish.

BART's Capacity Expansion Program is the principal factor supporting growth of peak period ridership which is within the District's control. The expected results of this program with respect to future increases in BART peak period capacity will be reviewed in the next section. Here it should be noted that the highest average peak period growth rate over the past five years was recorded on the one Transbay route where capacity could be increased during the peak hour (Richmond-Daly City) in spite of its circuitous nature. In the Transbay market, ridership is very responsive to capacity increases.

The importance of service quality as a factor in maintaining ridership was emphasized during FY 1985/86. During the latter half of 1985, peak period train service delays resulted from construction work on capacity expansion projects at Daly City station and the KE track in downtown Oakland. This service impact (coupled with high load factors during the prior three years) exacerbated the drop in patronage following the January 1986 fare increase. During the last three quarters, service quality has returned to the previous level. This should begin to be recognized in near-term patronage expansion. Continued ridership growth will depend heavily on maintenance of service quality. Every effort should be made to minimize the impact on service of the final stage of capacity expansion projects, such as the work at M-87 (in the vicinity of Daly City station) during the latter half of 1988. The updated demand forecast summarized below assumes that current high levels of service quality will be maintained and that construction impacts will be kept to an absolute minimum.

The leveling off of ridership after April 1985, the drop in patronage after the January 1986 fare increase and the long period before significant recovery support the need for a more comprehensive marketing program at BART. In such a program, promotion is but one facet of a total approach where concern for the rider is paramount in all aspects of service planning and delivery. Corporate leaders in many industries are beginning to recognize the need for this commitment, and BART is no exception. The updated forecast assumes that a comprehensive marketing program will be implemented during the planning period (see page 37).

Five-Year Patronage Forecast

The patronage forecast for the upcoming five-year period takes the actual estimated level of ridership during FY 86/87 as a starting point. The FY 86/87 estimate amounts to 196,000 per average weekday, 1,106,000 per typical week, and 56.8 million during the fiscal year.

Off-peak ridership, including both weekdays and weekends, grew at a rate of 2.5% during 1986. Prior to 1986, even higher growth rates were recorded. For the upcoming forecast, it is assumed that demand for weekday off-peak and weekend travel on BART will increase by 2.5% annually.

The peak period ridership forecast for FY 87/88 assumes a 1% growth rate over the FY 1986/87 actual/estimated level. This assumption reflects the fact that peak period load factors and ridership levels have remained relatively low by historical standards since the fare increase, despite service quality which has been at or near the highest level yet recorded. Although ridership is above the low recorded in June 1986, it has not returned to the prefare increase level. Underlying this trend is the fact that peak riders departed the system in greater numbers than did off-peak patrons since mid-1985.

Peak period ridership projections for the FY 88/89 - FY 91/92 period are based on one of two methods. Peak hour, peak direction Transbay projections are based on a load factor/growth rate relationship observed during the 1982-1985 period (and documented in the previous Five Year Plan). During that time, low load factors resulted in consistently higher than average growth rates and growth all but ceased as load factors approached 1.50. The model is a linear approximation of this relationship, ranging from 10% at a 1.1 load factor to 0% at 1.50. All remaining peak period trips are assumed to grow at the 2.7% annual rate discussed above.

The demand forecast thus depends on the timing and distribution of additional peak period trains (which is reviewed in more detail in the next section). A separate patronage estimate is shown for each planned service increment and each fiscal year. The updated patronage forecast is presented in Figure 13 in daily terms and is also summarized on a fiscal year basis.

NEW PEAK SERVICE CAPACITY

The goal of BART's Capacity Expansion Program is to reduce minimum allowable headways, thereby permitting more trains to be placed in service. Projects required to achieve or support each successive headway reduction are identified in Figure 14 together with their respective completion dates. The target dates reflect current plans for capital project implementation. However, these may be altered by funding limitations or changes necessary for smooth

Figure 13

PATRONAGE FORECAST BY FISCAL YEAR

	FY 1987/88	FY 1988/89	FY 1989/90	FY 1990/91	FY 1991/92
TYPICAL DAY PASSENGER TRIPS					
Peak Periods	97,250	105,363	109,690	115,027	120,762
Weekday Offpeak Period	102,630	104,829	107,468	110,171	112,929
Total Weekday	199,880	210,192	217,158	225,198	233,691
Saturday	83,500	85,603	87,758	89,965	92,217
Sunday	48,710	49,937	51,194	52,482	53,795
ANNUAL PASSENGER TRIPS (000)	57,894	60,773	62,731	64,969	67,327

FIGURE 14

BART CAPACITY EXPANSION PROGRAM

6/15/87

Minimum Headway Capability (Min:Sec)	Projects Required To Achieve or Support This Headway	Anticipated Project Completion Dates	Target Expanded Service Start Dates	Peak Hour Trains Peak Direction Transbay	Peak Period Capacity Trains		On-Line Cars	Spare Cars	Total Cars Required	Available Fleet A/C-Cars @85% B-Cars @90% (Extra)	Operating Fleet Size	
3:45 (except for 3:00 during peak 15 minutes)	Current Service	---	Nov 86	17	45	A B T	90 248 338	16 24 40	106 272 378	113 (+7) 272 (+0) 385 (+7)	134 303 437[d]	A B T
	Delivery of 48 C-Cars	Dec 87	Jan 88	17	45	A C B T	76 41 248 365	16 0 24 40	92 41 272 405	114 (+22) 41 272 427 (+22)	135[e] 48 303 486	A C B T
3:10	Removal of Vent Separation	Oct 87										
	Electrical Capacity Increase: - Install 3rd Rail - Yard Feeder	Dec 87 Mar 88										
	Daly City Turnback	Apr 88										
	Delivery of 48 Additional C-cars (96 total)	Jun 88	Sep 88	19	51[f]	A C B T	86 76 234 396[f]	14 6 37 57	100 82 271 453	114 (+14) 82 272 (+1) 468 (+15)	135 96 303 534	A C B T
2:30	Daly City Yard	Jul 88										
	New On-Board ATC (A-Car Retrofit)	Jul 88										
	M-87 Interlocking	Dec 88										
	Delivery of 54 Additional C-Cars (150 total)	Dec 88										
	Wayside Train Control/System Performance Mods	Jul 89										
	Electrical Capacity Increase: - Procure/Install Substation	Sep 89	Sep 89	21	50[h]	A C B T	70 116 214 400[h]	8 12 42 62	78 128 256 462	114 (+36) 128 272 (+16) 514 (+52)	135 150 303 588	A C B T
	ICS	TBD[g]										
2:15	Brake Rate Algorithm Modifications	June 90	Sep 90	24[h]	53[i]	A C B T	78 122 226 426[i]	14 6 42 62	92 128 268 488	114 (+22) 128 272 (+4) 514 (+26)	135 150 303 588	A C B T

FOOTNOTES TO CAPACITY EXPANSION PROGRAM (Figure 14)

[d] Status as of January 31, 1987; reflects 2 A-cars in use as engineering test vehicles and one A out for accident damage.

[e] Accident damaged A assumed to be repaired.

[f] Reflects addition of 3 trains and 13 cars on-line during peak; also includes 3 extra trains comprised of 18 cars and required for operation of Daly City Turnback (prior to system resignaling) which do not increase actual capacity during regular peak cycle.

[g] ICS is shown as necessary to support 2:30 headways assuming that more than 54 trains are required at this service level. Current plans are to operate less than 54 trains when this service increment commences. The planned upgrade to the existing train control computer is designed to accomodate up to 54 trains.

[h] Reflects addition of 2 trains and 22 cars on-line during peak (note: assumes requirement for 3 trains in Daly City Turnback is offset through resignaling).

[i] Reflects 3 trains and 26 cars in September 1990 with start of 2:15 headways. In the next and last year of the plan (FY 91/92), one additional train is projected bringing the peak hour Transbay count to 25 and the total trains on the system to 54. Car requirements during FY 91/92 are expected to increase by 26, bringing the total on-line to 452 and the total required including spares to 514 which equals the projected total cars available.

implementation. Each higher service level is characterized by the number of peak hour, peak direction Transbay trains, the total number of peak period trains and cars on line, spare car requirements, and total cars required. Projected availability figures are shown for comparison purposes. As shown in Figure 14, four service increments are planned for implementation during the five year period as completion of supporting capital projects permits.

Current BART service is nearly at capacity in terms of effective use of available B-Cars. Although additional A-Cars are available, any new trains would require taking B-Cars from already scheduled consists. The C-Car project will add 150 vehicles to the District fleet, the impact of which is reflected by BART's fleet size as shown in Figure 14.

Service Expansion Considerations

BART capacity expansion is essential based on ridership data and BART's Latent Demand Survey which indicates that current potential ridership is several times the number of commuters actually using the system. Growth of new CBD-oriented peak period travel is likely, given current and projected office expansion plans in San Francisco and Oakland. Significant expansion of highway capacity, especially during the next few years in the Transbay and other key corridors, is not planned. Programmed highway reconstruction for both I-80 and I-880 is expected to result in increased traffic congestion and a shift to BART usage as these long-term highway improvements require lane closures.

The BART Capacity Expansion Program is designed to meet this need to transport more commuters, especially in the Transbay corridor. This section outlines and updates the planned allocation of new service increments by route based on the peak demand forecast described above. The Transbay component of existing 45-train service is illustrated in Figure 15. This chart indicates the number and sequencing of trains by route for the P.M. peak train cycle and provides the baseline against which to compare subsequent service levels.

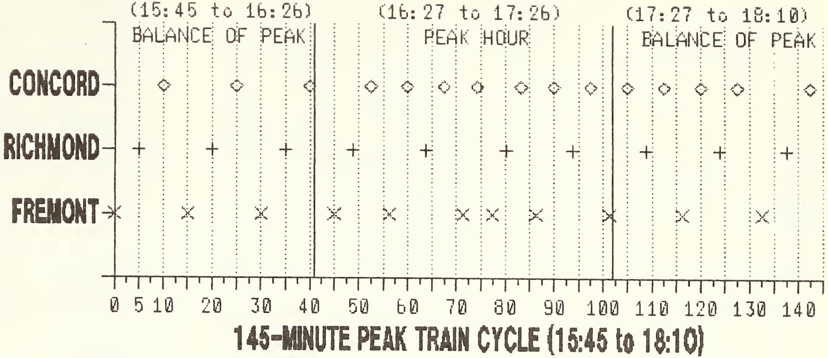
The peak hour demand projections updated in this plan assume that existing trains will be lengthened where possible in response to increased patronage before adding trains. There are two reasons for this. No further trains can be added to peak hour Transbay service until the next headway reduction (to 3 minutes 10 seconds) is possible in mid-1988. Also, trains in the balance (or "shoulder") of the peak generally have lower load factors and capacity to accommodate more cars.

Additional trains are programmed, as headway reductions permit, when the number of cars required to maintain a 1.1 load factor exceeds 10 times the number of trains on a given route. Under this approach, most of the planned additional trains are targeted for the two most heavily travelled routes. This allocation strategy has generally been the basis for previous plans. Current budget constraints support this rationale.

During 1986, total peak ridership by route was as shown in Figure 16. Ridership on the Concord route exceeded Fremont/Daly City patronage by 46%, Richmond/Daly City trips by 111%, and Richmond/Fremont volume by 281%.

FIGURE 15

45-TRAIN SERVICE LEVEL
PM PEAK PERIOD TRANSBAY SEQUENCE
PK HR: 7 CONCORD, 6 FREMONT, 4 RICHMOND



NOTES:
(1) Sequence starting at 3:45 PM from Embarcadero Station.
(2) Total of 45 trains on line -- C/DC=15, F/DC=11, R/DC=9, F/RI=10.
(3) Throughput on R/DC is 10 trains due to shorter route.
(4) Minimum headway is 3 minutes 45 seconds, except for 3-minute headways during peak 15 minutes.

Figure 16

PEAK PERIOD, PEAK DIRECTION
RIDERSHIP BY ROUTE, 1986

Route	Peak Hour	Balance of Peak Cycle	Total
Concord/Daly City	5,991	5,194	11,185
Fremont/Daly City	4,355	3,283	7,638
Richmond/Daly City	2,546	2,750	5,296
Richmond/Fremont	1,507	1,428	2,935
Total	14,399	12,655	27,054

The most crowded train load factor is an index of patron trip scheduling preference or constraint. Over the last several years, the peak has broadened on the Concord route as more riders adjusted their travel schedules in order to take advantage of lower load factors in the balance of the peak cycle. A significant proportion of Fremont/Daly City riders is unwilling or unable to do so. Thus, the Fremont/Daly City route experiences the highest level of crowding on the most heavily loaded train.

Capacity of the bus transit system and the highway network in each corridor should also be considered in allocating future BART peak capacity increases. The Concord route effectively has no parallel bus service, and virtually all highway traffic is constrained to the congested Caldecott Tunnel. The Richmond corridor is facing increased traffic congestion on Interstate 80, and this has reduced the travel time advantage of AC Transit service compared to BART. The corridor stretching south from Oakland to Fremont is served by Interstates 580 and 880, each of which is less congested than Interstate 80. AC Transit service, especially in the Interstate 580 corridor, is attractive and competitive with BART. Delays affecting traffic approaching the San Francisco-Oakland Bay Bridge are also increasing. This condition is beginning to affect the toll free carpool-bus lane through the Toll Plaza.

Planned Service Increments

All of the above factors have been considered in developing the proposed allocation of future BART service increments among the four routes currently operated. Planned additional trains and cars are indicated by route in Figure 17 together with existing service. The proposed plan calls for a phased increase of 9 trains from the 45 now operated to 54 by FY 91/92 in four increments.

- In January 1988, availability of a portion of the C-cars will permit lengthening of some existing trains.
- In September 1988 when headways are reduced to 3 minutes 10 seconds, three more trains will bring the total on-line to 48 (however, until the following increment, 3

Figure 17

TRAINS AND CARS BY ROUTE

FROM TO	Nov 86 Dec 87		Jan 88 Aug 88		Sep 88 Aug 89		Sep 89 Aug 90		Sep 90 Jun 91		Jul 91 Jun 92
HEADWAYS (Min:Sec)											
Minimum Sustainable	3:00		3:00		2:10		1:40		1:30		1:30
Minimum Scheduled	3:45*		3:45*		3:10		2:30		2:15		2:15
Basic Route: Peak /Midday	15:00		15:00		15:00		12:30/15:00		11:15/15:00		11:15/15:00
TRAINS ON LINE, BY ROUTE											
Concord/Daly City											
Peak 60 Minutes	7		7	+1	8	+1	9	+1	10	+1	11
Balance of Peak	8		8	+1	9		9		9		9
Fremont/Daly City											
Peak 60 Minutes	6		6	+1	7		7	+2	9		9
Balance of Peak	5		5		5		5		5		5
Richmond/Daly City											
Peak 60 Minutes	4		4		4	+1	5		5		5
Balance of Peak	5		5		5		5		5		5
Transbay											
Peak 60 Minutes	17		17	+2	19	+2	21	+3	24	+1	25
Balance of Peak	18		18	+1	19		19		19		19
Richmond/Fremont											
Peak 60 Minutes	5		5		5		5		5		5
Balance of Peak	5		5		5		5		5		5
All Routes											
Peak 60 Minutes	22		22	+2	24	+2	26	+3	29	+1	30
Balance of Peak	23		23	+1	24		24		24		24
Total	45		45	+3	48	+2	50	+3	53	+1	54
CARS ON LINE, BY ROUTE											
Concord/Daly City											
Peak 60 Minutes	69	1	70	10	80	10	90	10	100	10	110
Balance of Peak	65	7	72	-2	70	2	72		72	3	75
Fremont/Daly City											
Peak 60 Minutes	54	6	60	9	69	1	70	11	81	9	90
Balance of Peak	36	4	40	-2	38	1	39	1	40	1	41
Richmond/Daly City											
Peak 60 Minutes	34	6	40		40	6	46	3	49	1	50
Balance of Peak	39	3	42	-1	41	1	42	1	43	1	44
Transbay											
Peak 60 Minutes	157	13	170	19	189	17	206	24	230	20	250
Balance of Peak	140	14	154	-5	149	4	153	2	155	5	160
Richmond/Fremont											
Peak 60 Minutes	24	2	26	-1	25	1	26		26	1	27
Balance of Peak	15		15		15		15		15		15
All Routes											
Peak 60 Minutes	181	15	196	18	214	18	232	24	256	21	277
Balance of Peak	155	14	169	-5	164	4	168	2	170	5	175
Total	336	29	365	13	378	22	400	26	426	26	452

---

*Except for 3:00 minute headways during peak 15 minutes.

more trains will be needed to maintain headways in and out of the Daly City Turnback, bringing the total in service to 51 as shown in Figure 14).

- With the provision of 2 minute 30 second headways in September 1989, an additional two trains would be put in service for a total of 50 (signaling changes implemented at this time are expected to increase operating speed enough to eliminate the 3 train Daly City Turnback requirement (noted above for the previous service increment).
- When headways are reduced to 2 minutes 15 seconds, current plans call for 3 more trains, for a total of 53 on line.

Planned service increments reflect estimated requirements based on current demand projections. Should these requirements change prior to start-up dates, service increments will be modified accordingly.

January 1988: 29 Additional Cars

The first increment during the planning period involves the addition of 29 cars based on the projected availability of 48 C-cars as of December 1987. Opportunities for reducing discretionary train load factors to 1.1 exist on all four routes. Allocation based on this criterion calls for 8 cars to be added on the Concord/Daly City route, 10 on Fremont/Daly City, 9 on Richmond/Daly City and 2 on Richmond/Fremont, as shown in Figure 17*.

September 1988: 3 Extra Trains

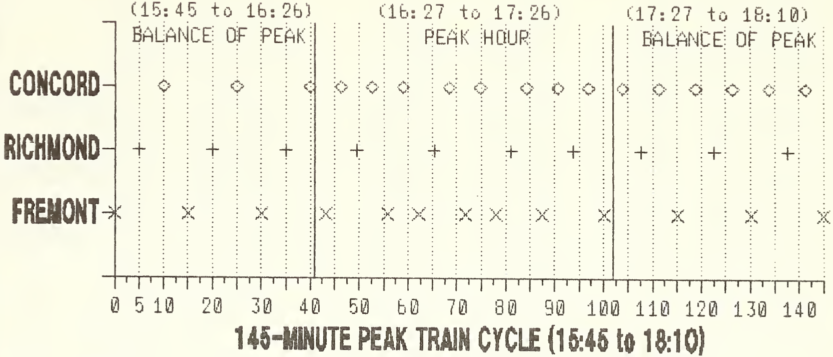
Reduction of minimum scheduled headways to 3 minutes 10 seconds, targeted for September 1988, will permit the addition of two trains to Transbay service in the peak hour. One each is proposed for the Concord and Fremont/Daly City routes. Additionally, maintenance of the 1.1 load factor on discretionary trains during the balance of the peak cycle is expected to require one more Concord train at this time. Total peak capacity would thus be increased by three trains, to 48 on-line. This schedule is shown diagrammatically in Figure 18.

---

*Subsequent to this analysis, the Board of Directors in reviewing objectives for FY 1987/88 called for maintenance of a 1.0 load factor on all discretionary trains as the new C-Cars are put into service. (Discretionary trains are those which can be lengthened.) The cost of this service modification has been reflected in the revised financial projections for FY 1987/88 in Figure 43 in Chapter III, along with the incremental revenue anticipated therefrom. Demand, car requirements, and passenger revenue projections for the remaining four years have not been adjusted to reflect this load factor policy. If the policy proves to be cost-effective, subsequent projections will be revised in the next five year plan update.

FIGURE 18

48–TRAIN SERVICE LEVEL
PM PEAK PERIOD TRANSBAY SEQUENCE
PK HR: 8 CONCORD, 7 FREMONT, 4 RICHMOND



NOTES:
(1) Sequence starting at 3:45 PM from Embarcadero Station.
(2) Total of 48 trains on line -- C/DC=17, F/DC=12, R/DC=9, F/RI=10.
(3) Throughput on R/DC is 10 trains due to shorter route.
(4) Minimum headway is 3 minutes 10 seconds.

Use of the Daly City Turnback will increase run time in and out of the turnback enough to require an additional train on each of the three Transbay routes. These extra trains are included in the total of 51 trains shown for this service level in Figure 14. However, they will serve the peak load point on each route after the peak period and thus do not represent an increase in peak period capacity. Resignaling of the system is expected to reduce run times enough to negate the requirement for these three extra trains by the subsequent service increment.

Concurrent with this service increment, the spares requirement will be increased by 17 cars in recognition of the longer average train length in peak service and thus required for spares.

September 1989: 2 Extra Trains

When capacity expansion projects required to support 2 minute 30 second headways are complete in September 1989, current plans are to add one additional peak hour train on each of the Concord and Richmond/Daly City routes. This schedule of 50 peak period trains is shown schematically in Figure 19.

Car requirements are expected to grow by 22 vehicles which are allocated to all four routes, as indicated in Figure 17. An increase in the spares requirement of 5 vehicles is also planned to support this service level. This increase is based on replacement of consists with the longer average train length expected to be in service at this time.

September 1990: 3 Extra Trains

The final phase of capacity expansion is programmed to support 2 minute 15 second headways. This is currently expected to start in September 1990. The patronage forecast and load factor criterion call for three additional peak hour Transbay trains. One would be added to the Concord route and two to the Fremont/Daly City route. This brings the total trains on-line to 53. With this service increase, 26 more cars would be added to peak period trains.

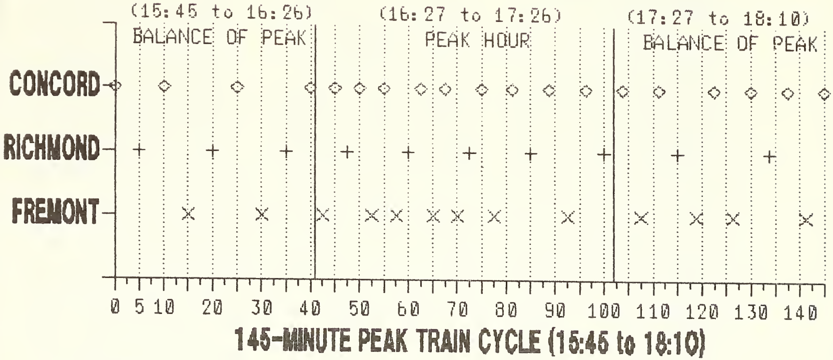
Anticipated patronage growth in the final year of the current planning period is anticipated to require an additional train on the Concord route and an additional 26 cars on all four routes. Note in Figure 14 that, with 54 trains in peak period service, all 452 vehicles available for on-line service are expected to be utilized.

Future Vehicle Requirements

According to current plans, all available vehicles including the C-cars will be in service as of FY 1991/92. Expansion of service capacity beyond this level will require the acquisition of additional rolling stock.

FIGURE 19

50-TRAIN SERVICE LEVEL
PM PEAK PERIOD TRANSBAY SEQUENCE
PK HR: 9 CONCORD, 7 FREMONT, 5 RICHMOND



NOTES:

(1) Sequence starting at 3:45 PM from Embarcadero Station.
(2) Total of 50 trains on line -- C/DC=18, F/DC=13, R/DC=9, F/RI=10.
(3) Throughput on R/DC is 10 trains due to shorter route.
(4) Minimum headway is 2 minutes 30 seconds.

Procurement of additional vehicles should be considered with sufficient lead time to bring on extra capacity when needed. The key factors influencing this decision will be the availability of capital funds and the growth of peak period demand.

SERVICE QUALITY

Although provision of adequate capacity has become the District's top priority, the District's policy is to insist on high quality service. Thus, the key consideration in adding new service is to maintain or enhance current reliability standards, even if that requires additional time for resolving problems and testing to assure a smooth transition to higher service levels. Indeed, improved service quality in the early 1980s was largely responsible for attracting additional BART patronage. Continued growth of BART ridership will depend heavily on the extent to which service quality can be maintained and improved. Because scheduling more trains on the system will alter the current operating environment, it will be essential to maintain system reliability while implementing capacity improvements. Work completed as a part of the System Performance Study has contributed to the identification of achievable capacity objectives in the context of current high reliability standards.

Many improvements in system performance were the direct result of the Reliability Improvement Program. This includes: increased on-time performance, improved car and train throughput, and reduced incident rates for passenger offloads, AFC equipment, and train removals.

Earlier service quality improvements supported BART's decision in 1978 to publish a train schedule for both evening and weekend service. Daytime weekday train performance improvements, as reflected by a 95% on-time record, justified publication of a similar schedule for weekday operations in April 1983. Maintenance of service standards will be increasingly challenging as BART commences its service expansion program.

COST EFFECTIVENESS AND PRODUCTIVITY

Cost effectiveness and productivity are integral to overall financial performance and the economies of providing expanded levels of service. Favorable performance in these as well as other areas is directly dependent upon management's ability to formulate and implement effective programs to control costs. BART's costs per passenger, and per vehicle mile have declined over the past eight and one-half years, as shown by the constant dollar comparisons in Figures 20 and 21. For most of this period, BART patronage and vehicle miles per equivalent employee have risen. Additional gains in the future will be harder to attain. Management efforts will need to focus on strategies to hold the line on expense and to evaluate new ways of increasing ridership and allocating resources.

Labor costs comprise the largest component of total operating expense and the one expense factor most directly under District control. To the extent that output can be increased without proportional increases in staffing, future labor cost increases can be held within the limits of available resources.

Figure 20

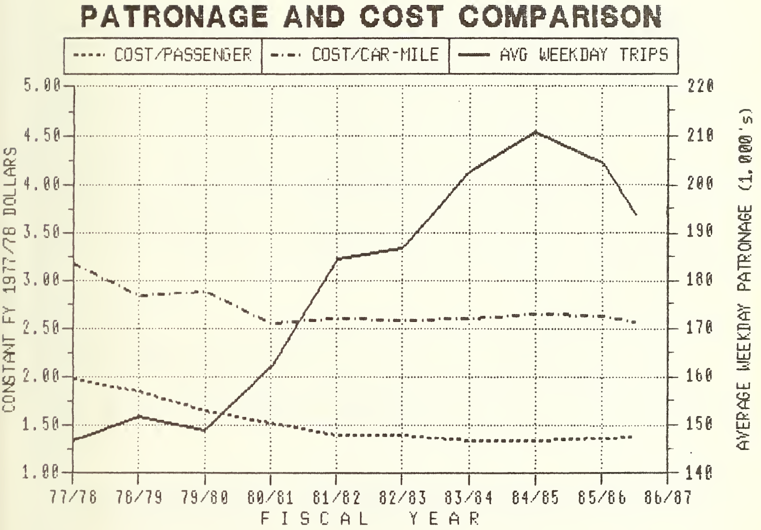
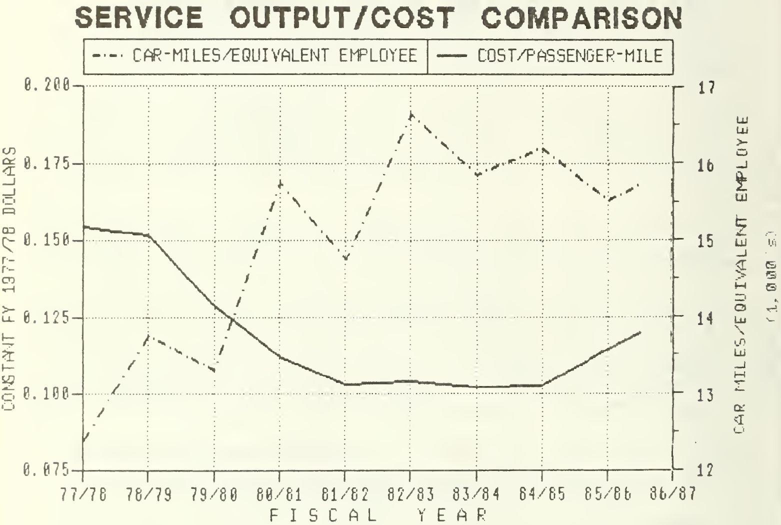

PATRONAGE AND COST COMPARISON
COST/PASSENGER
COST/CAR-MILE
AVG WEEKDAY TRIPS
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
CONSTANT FY 1977/78 DOLLARS
220
210
200
190
180
170
160
150
140
AVERAGE WEEKDAY PATRONAGE (1,000's)
77/78
78/79
79/80
80/81
81/82
82/83
83/84
84/85
85/86
86/87
FISCAL YEAR

Figure 21


SERVICE OUTPUT/COST COMPARISON
CAR-MILES/EQUIVALENT EMPLOYEE
COST/PASSENGER-MILE
CONSTANT FY 1977/78 DOLLARS
0.200
0.175
0.150
0.125
0.100
0.075
CAR MILES/EQUIVALENT EMPLOYEE
(1,000's)
17
16
15
14
13
12
77/78
78/79
79/80
80/81
81/82
82/83
83/84
84/85
85/86
86/87
FISCAL YEAR

Additionally, since electrical energy is the largest non-labor expense item, District efforts will need to focus on developing operating strategies which can minimize power consumption (e.g., car miles), consistent with load factor objectives. Similar consideration will need to be given to purchased transportation expense, the second largest non-labor expense item. The programmed streamlining and possible privatization of BART express bus service will continue to be evaluated in terms of impact on operating costs and farebox ratio.

On the funding side, increasing transit operator demands for regionally allocated discretionary funds are expected to limit BART's share of these resources. Additionally, capital funding limitations may require BART to continue to generate a portion of its capital funding requirements through operating sources in order to provide for essential system replacements and improvements. These limitations are expected to become more severe as competition for decreasing federal capital funds becomes more intense.

Continued pressure on the District's financial resources will further emphasize the need for efficient and effective operating strategies which incorporate innovative productivity measures. Further, key capital improvements which can enhance current operational efficiencies will need to be completed in order to realize long-term economies and increased productivity. Both the Daly City Turnback and Yard and the new C-cars will produce significant operational benefits and resulting cost savings as has the KE Track which has been in operation for just over one year. Every potential operating efficiency must be examined in order to take the necessary steps to reduce cost pressures and minimize the impact of any required fare increase.

PROGRAM DELIVERY

Realizing BART's inherent economies of scale and latent capacity potential by the end of this planning period is a realistic but challenging objective. Based on the projections noted above, it seems reasonable to expect significant growth in ridership if capacity increases can be delivered in a timely manner. These capacity increases depend heavily on implementation of the District's Capital Improvement Program which is discussed in detail in Volume II.

The provision of increased capacity depends upon the joint implementation of critically needed projects. Lacking one or more components, the system will not be capable of performing at the required higher level of capacity. Estimated completion dates for these projects are highlighted in Figure 14 above. The service expansion scenario also described above depends completely upon the realization of these capacity enhancements as scheduled. Timely funding and effective project management are therefore essential to assure the scheduled delivery of these important capital improvements.

EXTENSIONS

Extensions to the 71-mile basic system were thoroughly reviewed in the "New Starts and Extensions" hearings held by the Metropolitan Transportation Commission (MTC) in FY 1983/84 for the purpose of prioritizing these and other regional projects for future implementation. The resulting MTC New Starts and Extensions Progam supports BART rail extensions to North Concord/ West Pittsburg, to Irvington/Warm Springs in Fremont, and to Castro Valley/Dublin (all three of which are in BART's Extension Policy, Inside Current District). The MTC program also supports a BART extension to San Francisco International Airport from Daly City, a BART extension to San Jose from Fremont, and an Oakland Airport Connector from Coliseum/Oakland Airport BART Station.

Acquisition of extension station sites is in progress. Interim usage of these future rail station sites is being coordinated with the District's planned improvements to the express bus program to provide freeway-oriented, park/ride lots for express bus service.

MAINTENANCE REQUIREMENTS

In late 1976, BART adopted a new maintenance and engineering philosophy which led to the development of a new Maintenance Plan. For the three maintenance divisions: Engineering establishes criteria, Maintenance performs the work using Engineering provided documents, with Inspection ensuring that Maintenance is performing to Engineering criteria. This proven philosophy is expected to remain in effect during the current five-year planning period. A description of District maintenance departments, personnel, facilities, and a summary of BART's maintenance program are included in Appendix A in Volume III.

EXPRESS BUS EFFECTIVENESS AND PRODUCTIVITY

Concern about the cost, relatively low farebox recovery ratio, and local service nature of BART express bus service led to an ongoing process of reevaluation of this program. Efforts to upgrade the program began with the drafting of a revised scope of services which formed the basis for an amended contract signed during FY 1984/85. On-time performance standards and a farebox revenue objective were established. The reevaluation of service seeks to identify opportunities for modification or elimination of particularly low performing route segments and opportunities for reduction of scheduled travel times by shifting to more freeway-oriented operations.

ENERGY CONTINGENCY REQUIREMENTS

Although gasoline supplies are currently more than adequate, energy contingency concerns should not be ignored. In the event of a significant gasoline shortage which would divert large numbers of automobile commuters to the system, BART will not be able to expand peak period service until the new revenue vehicles on order are delivered. All available BART rail vehicles are essentially used to provide current service. Significant capacity expansion will not occur until September 1988 with the reduction in Transbay headways to 3 minutes 10 seconds.

In view of this inability to expand capacity significantly until the latter part of 1988, BART's response to a gasoline shortage will of necessity be comprised of the following types of activities:

- Extension of peak period service beyond the current transition to off-peak service to accommodate commuters who can shift their normal working hours;
- Provision of information about train loading patterns especially with reference to space available in non-peak directions for reverse commuting;
- Consideration of higher peak period fares to shift non-essential trips to off-peak periods.

Each of these responses to a gasoline shortage condition could be implemented within a fairly short time interval.

CAPITAL INVESTMENT PLANNING

For the past several years, BART has recognized the need to implement capacity expansion projects which will augment the capability of the present system to transport commuters into the Central Business Districts of San Francisco and Oakland. This need to develop and finance a number of major capacity expansion projects has entailed a comprehensive capital investment planning effort. This work involves a determination of needs and/or problems to be resolved, identification of alternatives, and evaluation of potential solutions. After selection of appropriate projects, funding strategies are developed to maximize state and local financial resources. Capital investment planning, following these guidelines, is an integral part of BART's Five Year Planning process and is discussed in detail in Volume II.

PRIVATIZATION

Although BART is a public agency, a considerable amount of its operating budget is spent on contracted provision of goods and services, mainly through private firms. There is growing recognition that private providers may have an important role in support of transit operations, especially as public financial support is diminished. Pressure on future operating budgets will require that alternative sources of goods and services be considered. BART has already identified possible opportunities for private providers of selected feeder and/or express bus service and has established a notification process to ensure that such opportunities are communicated to private providers. In addition, BART seeks to participate actively with the private sector in a joint development program as a means of financing access improvements and develop attractions near stations.

In response to more definitive federal guidelines on privatization, BART has prepared detailed documentation of District policy and procedures in support of maximizing private sector participation. This information will be transmitted to the Urban Mass Transportation Administration (UMTA) in support of current grant applications and is contained in Appendix B in Volume III.

DISADVANTAGED AND WOMEN BUSINESS ENTERPRISE

All sectors of the economy merit an equal opportunity to compete for work in publicly financed endeavors. BART has specifically recognized this concern in setting its annually adopted performance objectives. BART performance through FY 1985/86 has approximated the District's goals, and District management recognizes the need to maintain a strong resolve to provide an affirmative action contract environment.

COMPREHENSIVE MARKETING

It has long been recognized that the existing BART system can accommodate much more travel relative to current levels during off-peak hours when capacity is readily available. Nonwork-related travel in the off-peak has, in fact, been the District's primary marketing target for a number of years. Since the January 1986 fare increase and initial ridership downturn and subsequent leveling, it is recognized that BART's marketing efforts need to be expanded to include the commute market as well. The District's marketing efforts will reflect this most recent shift in emphasis (e.g., to include the peak commute market).

FIVE YEAR PLANNING PROCESS

BART was in the vanguard of transit systems which developed management-by-objectives processes, systematic performance monitoring, and five-year planning efforts. This philosophy continues to guide District management and policy makers. The District's Quarterly Performance Report on System Objectives is integral to the five-year planning process and serves as a detailed checklist by which management performance is routinely monitored and publicly communicated. This process is considered to be essential to sound management and effective delivery of responsive BART service.

BART's Five Year Plan includes an analysis of key factors which affect the management and operation of the system. As such, service planning is a major focus as is the development of five-year financial forecasts. Periodic fare structure adjustments are necessary to keep pace with inflation and provide new services as appropriate. In this regard, the planning process is essential as a means to determine the magnitude of equitable fare increases necessary for the attainment of incremental revenue targets.

BART's Five Year Plan also addresses improved efficiency of operation through the Productivity Improvement Program, and monitors Elderly and Handicapped services through the BART Access Program.

CHAPTER II

PERFORMANCE EVALUATION
&
SERVICE IMPROVEMENTS

The underlying premise of BART is to provide transportation that is safe, comfortable, convenient, reliable, and efficient. With a safety record well within accepted industrywide standards, BART demand is largely influenced by the remaining characteristics just noted relative to alternative modes (primarily automobile):

> Is there **adequate capacity** at **frequent intervals** to accommodate demand?
>
> Is the service **reliable** to the extent that travel times are predictable and consistent?
>
> Is the service **cost-effective** to provide and use?

This chapter will focus on an evaluation of District performance in terms of the quantity and quality of **BART SERVICE DELIVERY** as the primary factors which are reflected by **PATRON RESPONSE** (i.e., ridership) and **FINANCIAL PERFORMANCE.**

The discussion begins with the key attributes of service delivery from the perspective of shop production and meeting car availability objectives to delivering passengers to their destination stations ontime with consideration for safe and free passenger flows entering and exiting stations. Figure 22 on the following page summarizes these service delivery attributes and the key indicators used to measure performance. These key indicators correspond to selected District objectives which have been identified as those high-level measures which best characterize overall train service quality, fare equipment dependability, patron response, and financial performance. Performance with respect to supporting District objectives is also discussed as these other measures relate to the key objectives. A complete performance record for all of BART's FY 1986/87 objectives is presented in Figure 23. Additionally, performance achievements and deficiencies are presented with corrective actions identified as the District's strategy for improving productivity, efficiency, and overall performance. The emphasis of this evaluation is on system operations and includes a discussion of necessary programs and capital projects which have been identified as a prerequisite to achieving higher performance levels. For additional details regarding individual capital projects and related expense, refer to Volume II: Capital Improvement Plan.

CAR AVAILABILITY

As shown in Figure 22, the delivery of desired service begins with meeting car availability objectives so that scheduled capacity can be provided in terms of the number of cars and trains online. Figure 24 on page 44 identifies quarterly car availability versus objectives since July 1982. Car availability has been favorable throughout the 4-1/2 year period shown with the exception of mid 1985 when available B-cars dipped just below the service requirement objective. This occurred during the midst of the District's vehicle fire-hardening program which required that 5 A-cars and 11 B-cars be rotated out of service at any one time. This program was completed in August 1986 and has resulted in higher car availability as shown by the chart. This supported an expansion of peak period service from 43 to 45 online trains beginning November 3, 1986, two months ahead of the January 1987 target for

Figure 22

DESIRED PERFORMANCE ATTRIBUTES AND RELATED KEY DISTRICT INDICATORS

Meet Car Production Schedule to Support Train Schedule
Four AM Car Availability

Provide Scheduled Train Runs
Scheduled Train Dispatches Completed

Run Trains Without Delay
Peak Period Train Delay Events

Provide Scheduled Transbay Capacity
Peak Period Transbay Throughput

Deliver Patrons On Time
Patron On-Time Performance

Maintain Unimpeded Patron Flows Through Stations
AFC Incident Rate

Achieve Ridership Forecasts
Average Weekday Patronage

Achieve Revenue Forecasts and Keep Expenses Within Budget
Rail Farebox Ratio
System Operating Ratio
Rail Cost Per Passenger Mile

Figure 23

STATUS FOR FY 1986/87 DISTRICT OBJECTIVES*
FIRST HALF PERFORMANCE

OBJECTIVES[a]	JUL-DEC 1986 YTD			FY 1986/87 YEAR-END OBJECTIVE
	ACTUAL	OBJECTIVE[b]	OBJECTIVE STATUS[c]	
A1. Load Factors: Peak Period[d] -- Concord/Daly City	1.09	Balance Within System Limits	(e)	Balance Within System Limits
Fremont/Daly City	1.11			
Richmond/Daly City	1.08			
Fremont/Richmond	0.98			
Offpeak Period[f]	0.75	1.05	(g)	1.05
A2. Peak Period/Peak Direction Transbay Throughput (%): Trains	98.3	98.0	Met	98.0
Cars	97.3	97.5	Met	97.5
A3. Weekday 4 AM Car Count: A-Cars	112	102	Exceeded	102
B-Cars	274	261	Exceeded	261
A4. Add Two Peak Period Trains by January 1987 (Yes/No)	Yes	Yes	Met	Yes
B1. Scheduled Weekday Train Dispatches Completed (%)	99.2	99.0	Met	99.0
B2. Weekday Train On-Time Performance (%): Daily	95.6	95.0	Exceeded	95.0
Peak Period	94.3	93.0	Exceeded	93.0
B3. Peak 7-Minute Delays (Per 100 Train Runs):[h] Delay Events	1.94	2.00	Exceeded	2.00
Trains Delayed	5.74	6.00	Exceeded	6.00
B4. Patron Trip On-Time Performance (%)	94.2	94.0	Met	94.0
B5. Offloads (Annual Incidents/1000 Car-Hrs):[i] Vehicle Equipment	0.89	1.10	Exceeded	1.10
Wayside Equipment	0.06	0.10	Exceeded	0.10
Operations & Other	0.54	0.80	Exceeded	0.80
Total	1.48	2.00	Exceeded	2.00
B6. AFC Performance: Incidents/1000 Trips	0.32	0.30	Not Met	0.30
6 AM Entry/Exit Gate Availability (%)	96.2	95.0	Exceeded	95.0
6 AM Ticket Vendor Availability (%)	91.2	90.0	Exceeded	90.0
B7. Weekday 6 AM Elevator/Escalator Availability (%): Elevators	99.4	95.0	Exceeded	95.0
Escalators	98.6	93.0	Exceeded	93.0
B8. Express Bus On-Time Performance (%)	98.3	95.0	Exceeded	95.0
C1. Patron Accidents (Annual Rate--Incidents/Million Trips)[i]	15.8	17.7	Exceeded	17.7
C2. Employee Lost-Time Rate Due to Industrial Injuries(%)	0.94	0.50	Not Met	0.50
C3. Emergency Plan Exercises (Number Conducted/Month)	2.5	1.0	Exceeded	1.0
D1. Patronage (Number of Trips): Average Weekday	193,825	206,476	Not Met	208,000
4-Hour Weekday Peak	94,226	103,302	Not Met	104,200
Weekday Offpeak	99,599	103,174	Not Met	103,800
Saturday	83,676	91,738	Not Met	93,200
Sunday	47,483	49,162	Not Met	49,600
D2. Offpeak Patronage (% Above Forecast): Weekday	-3.5	3.0	Not Met	3.0
Saturday	-8.8	3.0	Not Met	3.0
Sunday	-3.4	3.0	Not Met	3.0
D3. System Cleanliness (%):[j] Station Facilities	94.5	90.0	Exceeded	90.0
Trains	99.0	90.0	Exceeded	90.0
D4. Patron Complaints About Employees (Per Million Trips):[k]	13.62	8.75	Not Met	8.75
D5. On-Board Service Announcements (% of Required):	(l)	95.0	Future	95.0
D6. Install 12th Street Prototype Information Panels (Yes/No)	No	Future	Future	Yes
D7. Initiate RTA Information Panels Project (Yes/No)	Yes	Yes	Met	Yes
D8. Increase Offsite Ticket Sales Outlets to 125[m]	112	Future	Future	Yes

*All letter footnotes appear on page 43.

Figure 23
(Continued)

STATUS FOR FY 1986/87 DISTRICT OBJECTIVES*
FIRST HALF PERFORMANCE

OBJECTIVES[a]	JUL-DEC 1986 YTD			FY 1986/87 YEAR-END OBJECTIVE
	ACTUAL	OBJECTIVE[b]	OBJECTIVE STATUS[c]	
E1. Farebox Ratios (%): Rail	52.8	51.2	Exceeded	52.3
Express Bus	10.6	13.6	Not Met	13.6
Total Operation	48.3	47.3	Exceeded	52.8
E2. Rail Cost Per Passenger-Mile (¢)	20.8	20.9	Met	20.5
E3. Vehicle-Miles/Equivalent District Employee	15,391	14,686	Exceeded	14,686
E4. System Utilization (%--Passenger-Miles/Seat-Mile)	32.4	35.7	Not Met	35.7
E5. Paid Sick Leave (%--Sick Hours Paid/Straight-Time Hours Paid)	3.65	3.50	Not Met	3.50
E6. Report Availability (Production Days):[n] Monthly Patronage	10.3	10.0	Not Met	10.0
Budget Performance	13.7	15.0	Exceeded	15.0
Affirmative Action	(p)	15.0	Not Met	15.0
Financial Statements	35.5	25.0	Not Met	25.0
Quarterly Performance	33.5	35.0	Exceeded	35.0
Operations Performance	47.0	45.0	Not Met	45.0
Annual Report	(p)	75.0	Not Met	75.0
F1. Affirmative Action (Yes/No): Evaluate Performance vs 1983 Plan	Yes	Yes	Met	Yes
Update 1983-1986 Plan by Dec 86	Yes	Yes	Met	Yes
F2. Achieve Workforce Representation Objectives	(q)	(q)	(q)	Yes
F3. MBE Participation (%):[r] Federally Assisted -- WBE	1.2	3.0	Not Met	3.0
DBE	23.9	18.0	Exceeded	18.0
Total Contracts -- MBE	19.8	21.0	Not Met	21.0
F4. Equity Participation for Joint Development Projects (%)	(s)	15.0	(s)	15.0
G1. New Parking:[t] Existing Rail Stations (2,455 Stalls)	1,008	Future	Future	2,455
Express Bus Lots (500 Stalls)	213	Future	Future	500
Total (2,955 Stalls)	1,221	Future	Future	2,955
G2. Seek Land for Bond List Surface Parking Projects (Yes/No)	Yes	Yes	Met	Yes
G3. Continue to Implement BART/AC Schedule Coordination (Yes/No)	Yes	Yes	Met	Yes
G4. First Stage West Corridor Express Bus Streamlining (Yes/No)	No	Future	Future	Yes
G5. Implement Express Bus/Rail Ticket (Yes/No)	No	Future	Future	Yes
G6. Implement Joint BART/AC Ticket (Yes/No)	No	Future	Future	Yes
G7. Initiate Phase II Elevator Improvements Installation (Yes/No)	No	Future	Future	Yes
G8. Platform Edge Project (Yes/No): Complete Evaluation	Yes	Yes	Met	Yes
Seek Funds (if appropriate)	Yes	Yes	Met	Yes
H1. Complete Station Area Plans (Yes/No): Fremont	Yes	Yes	Met	Yes
Concord	Yes	Yes	Met	Yes
H2. Initiate Station Area Plans for Two Stations (Yes/No)	Yes	Yes	Met	Yes
H3. Continue Anchor Tenant Marketing Effort (Yes/No)	Yes	Yes	Met	Yes
H4. Negotiate a Minimum of One Acceptable Ground Lease (Yes/No)	No	Future	Future	Yes
H5. Negotiate 5th & Market Special Entrance Agreement (Yes/No)	No	Future	Future	Yes
H6. Seek Additional Special Station Entrances (Yes/No)	No	Future	Future	Yes
I1. Assist in Completing Fremont-South Bay PDAA/DEIS (Yes/No)	No	Future	Future	Yes
I2. Pursue Acquisition of All Extension Program Sites (Yes/No)	Yes	Yes	Met	Yes
I3. Complete Pittsburg-Antioch PDAA/DEIS (Yes/No)	No	Future	Future	Yes

*All footnotes appear on page 43.

Figure 23

N O T E S: STATUS FOR FY 1986/87 DISTRICT OBJECTIVES

a. Letter and number designations refer to the full objective set. Letter references denote corresponding program area.

b. Year-to-date objective levels may not be equal to the annual objectives which represent an average for the entire year. Non-operating program objective levels shown as "Future" indicate that achievement is slated to occur at a later date during FY 1986/87.

c. Objectives are judged to be met if the ratio of actual to desired performance is within 0.5% of objective levels, where a maximum value is desired. The reciprocal of this calculation is taken where a minimum value is the desired objective. Status for non-operating program objectives shown as "Future" indicates achievement is slated for a later date this fiscal year.

d. Peak period load factor objective is to balance load factors wherever possible across the four routes at the maximum load point. Data presented here are for "discretionary trains," or those consists which can be lengthened or shortened within the 3- to 10-car limitation.

e. The scheduled route capacity for discretionary trains came within 1.1% of the optimum car allocation for the July-December 1986 period.

f. Offpeak load factors are for weekday trains only and represent the average of the highest loading for each midday and night train.

g. During the October-December 1986 quarter, this objective was achieved for 51 of 53 offpeak trains which operate on weekdays (i.e., the maximum average load factor did not exceed 1.05 for all but 2 weekday offpeak trains).

h. "Delay events" are the primary causes of one or more train delays. "Trains delayed" are the total number of trains impacted by the primary delay events. Rates are expressed as per 100 train runs (excluding cancelled dispatches).

i. Annual rates are based on 12 months' data ending with the final month of each quarter. Offload data for the last seven quarters reflect a change in accounting for offloads at South Hayward effective December 1984.

j. Indicates percentage of all station facilities or trains (as measured by individual evaluations for vehicles) having met established cleanliness standards.

k. Complaint data are categorized for three groups of employees: train operators, station agents, and all "other" employees (includes complaints about employees which result from face-to-face contact or telephone contact).

l. Data are for the Annual Passenger Services Sampling Survey (conducted each May) which includes sampling of on-board service announcements for arrival stations, transfer points, delays of 1-5 minutes, and delays in excess of 5 minutes. No data are available for the current quarter.

m. The objective figure of 125 outlets and the actuals reported refer to the number of retail and bank ticket outlets only. In addition to these are other outlets sponsored by employers, schools, senior centers, and other social service agencies.

n. Refers to the average time (in workdays) for production as measured by the number of days between the end of a report period and when the report actually is made available.

p. No report issued during this period.

q. For details concerning the achievement of BART's workforce representation objectives, refer to the District's 1983-86 Affirmative Action Assessment.

r. Percentages are based on committed contract dollar amounts for all contracts other than that with SOFERVAL (for procurement of 150 new C-Cars). This latter $183.8 million contract (estimated to be $279.0 with escalation and sales tax) has a separate 14% MBE commitment objective on the U.S. portion of the contract, which is estimated to be 65% of the total contract.

s. Contract commitments have not been formalized to date relative to MBE participation for joint development projects.

t. This objective is based on the implementation of 500 new BART-owned parking spaces at North Concord/Martinez Express Bus facility and 2,455 additional new spaces at existing rail stations as follows: Fremont (1,200 spaces), Lafayette (220 spaces), Orinda (150 spaces), North Berkeley (80 spaces), Hayward (330 spaces), San Leandro (250 spaces), and Fruitvale (225 spaces).

Figure 24

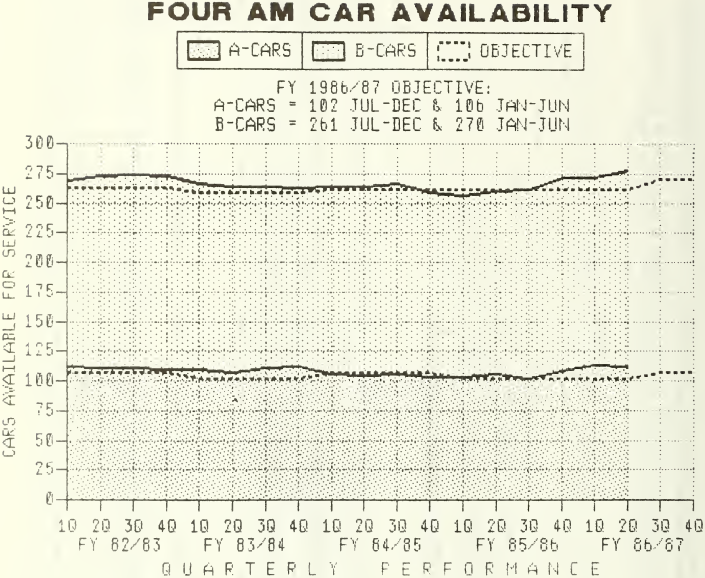

FOUR AM CAR AVAILABILITY
A-CARS
B-CARS
OBJECTIVE
FY 1986/87 OBJECTIVE:
A-CARS = 102 JUL-DEC & 106 JAN-JUN
B-CARS = 261 JUL-DEC & 270 JAN-JUN
CARS AVAILABLE FOR SERVICE
300
275
250
225
200
175
150
125
100
75
50
25
0
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

Figure 25

CURRENT SERVICE
(As of December 1986)

	COMMUTE WEEKDAY				SATURDAY[a]		SUNDAY[a]	
	AM PEAK	MIDDAY[a]	PM PEAK	NIGHT[a]	DAY	NIGHT	DAY	NIGHT
NUMBER OF TRAINS								
Concord/Daly City	15	10	15	7	8	7	7	7
Fremont/Daly City	11	10	11	b	8	b	b	b
RichmondDaly City	9	9	9	b	7	b	b	b
Fremont/Richmond	10	10	10	7	8	7	7	7
Total On-Line	45	39	45	14	31	14	14	14
Spares	8	7	8	7	c	c	c	c
Total Required	51	46	51	21	c	c	c	c
A-CARS								
Concord/Daly City	30	20	30	14	16	14	14	14
Fremont/Daly City	22	20	22	b	16	b	b	b
Richmond/Daly City	18	18	18	b	14	b	b	b
Fremont/Richmond	20	20	20	14	16	14	14	14
Total On-Line	90	78	90	28	62	28	28	28
Spares	16	14	16	14	c	c	c	c
Total Required	106	92	106	42	c	c	c	c
Maintenance (15% of Fleet)	21	21	21	21	21	21	21	21
B-CARS								
Concord/Daly City	107	24	108	35	15	14	37	7
Fremont/Daly City	71	16	69	b	16	b	b	b
Richmond/Daly City	43	15	47	b	14	b	b	b
Fremont/Richmond	20	10	20	7	8	7	12	7
Total On-Line	241	65	244	42	53	21	49	14
Spares	24	8	24	12	c	c	c	c
Total Required	265	73	268	54	c	c	c	c
Maintenance (10% of Fleet)	31	31	31	31	31	31	31	31

---

a. Base service requirement without consideration of major special events which may require additional capacity

b. No service on these routes during these times.

c. Spare requirements are a yard option for weekend service. A minimum of one train per yard is kept as a ready spare.

this service expansion. Figure 25 summarizes the car and train requirements for current weekday and weekend service, including ready spare and maintenance requirements.

Above objective car availability is evidence of the effectiveness of BART's maintenance program which aims to produce availability rates of 85% for automatic train control (ATC) equipped A-cars and 90% for mid-train B-cars. Based on a current operating fleet of 134 A's and 303 B's, objective availability is 114 A-cars and 272 B-cars. The number of trains on line determines the A-car requirement. At 2 A's per train, the net result is that BART has 8 A-cars in excess of its 45-train service and maintenance requirements. (The District owns 3 additional A-cars, 2 of which have been converted to engineering test vehicles and a third with extensive damage that has been removed from the operating fleet.)

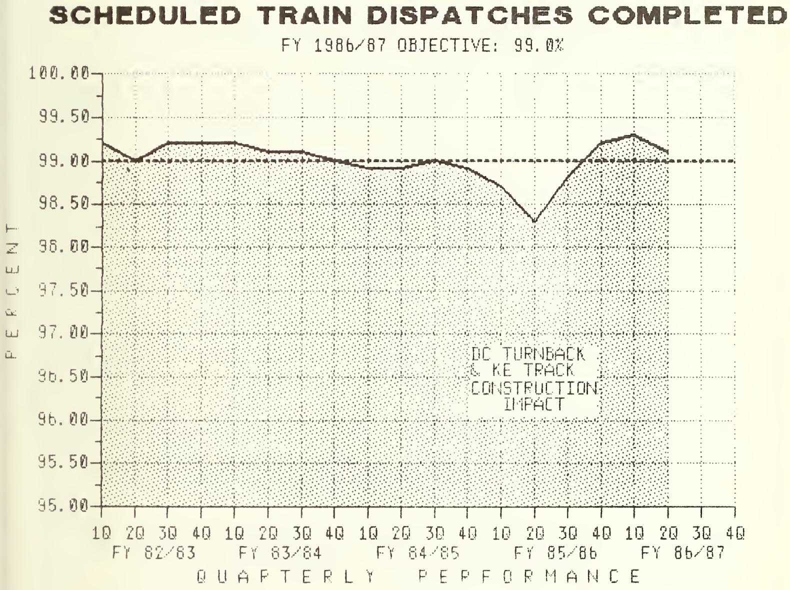
Thus, it is currently possible to expand service by adding 4 new trains for a total of 49 online. Three factors argue against this service expansion in advance of the completion of the District's Capacity Expansion Program. First, existing headway constraints dictate that any additional new trains be inserted into the schedule outside the peak hour (i.e., extending higher frequency service further into the "shoulder" or balance of the peak period). A significant shift of ridership out of the peak would need to take place or additional demand would need to occur to warrant this expansion. Current train load factors during the balance of the peak period indicate that expanded service during this period is not justified at this time. Secondly, BART currently has only 4 B-cars in excess of its service and maintenance requirements. These cars could effectively be used to lengthen already scheduled trains which are less than the 10-car maximum as ridership warrants. The third factor which must be considered is the added labor expense associated with the train operators required for the new trains.

Given the current vehicle fleet, favorable car availability will assist the District in delivering maximum service and capacity. Further, the District will continue to closely monitor train loadings to meet load factor objectives and keep within budgeted car hours. The delivery of 150 new C-cars by December 1988 translates into 127 additional vehicles available for service (at an 85% availability standard).

SCHEDULED TRAIN DISPATCHES COMPLETED

The graph in Figure 26 summarizes performance with respect to scheduled train dispatches completed for the past 4-1/2 years. With the exception of the 3 quarters in FY 1985/86 (when Daly City Turnback and KE Track construction directly impacted service with respect to all key train performance indicators), performance has been favorable relative to this stringent 99% objective. The achievement of this service and capacity objective has greatly assisted BART in balancing load factors and providing scheduled Transbay throughput, as will be discussed in following sections.

Figure 26


SCHEDULED TRAIN DISPATCHES COMPLETED
FY 1986/87 OBJECTIVE: 99.0%
100.00
99.50
99.00
98.50
98.00
97.50
97.00
96.50
96.00
95.50
95.00
PERCENT
DC TURNBACK
& KE TRACK
CONSTRUCTION
IMPACT
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

BART currently schedules 518 train dispatches on a typical weekday (i.e., a run from one end of a route to the other end). This will increase as service is expanded and more online trains are added. With increased service, it is essential that the District's efforts to achieve its offload objective be met since this impacts the level of incomplete train runs and service disruptions which are discussed in the next section on delays.

SERVICE DELAYS

Favorable car availability and scheduled train dispatches completed alone cannot assure the provision of high quality service. Consideration must also be given to service delays and their causes. The emergence of this service delivery factor as an important reliability measure led to implementation of the District's Delay Monitoring Program. This effort, which began in February 1981, tracks all delay events causing peak period trains to be detained more than seven minutes. Figure 27 presents BART performance with respect to peak period delay events. As shown, the delay event rate hovered between 2.25 and 2.50 per hundred train runs during the 3-year period of FY 1982/83 to FY 1984/85. The impact of Daly City Turnback and KE Track construction is clearly apparent in FY 1985/86 with the rate rising to just over 3.25 events per 100 train runs in the second quarter that year. Completion of the KE Track in January 1986 resulted in a downturn for delays in the third quarter with the delay event rate falling to almost the 2.00 objective by the fourth quarter. (Daly City Turnback construction required the removal of one of three train berthing platforms on a rotating basis at Daly City Station. KE Track construction required manual train operations between MacArthur and 19th Street Stations. These events are largely responsible for the unfavorable upswing for the peak period train delay rate during this period.)

Most recent FY 1986/87 year-to-date data indicate the most favorable rates for peak period delay events and delayed trains since the inception of the Delay Monitoring Program. Continuing review of the data forms the basis for formulating the District's strategy for reducing the probability of delay incidents, and developing operational strategies to minimize the impact of delays. The results of this effort are also apparent with respect to improved performance relative to the District's offload objectives. Favorable performance in this area of operations has resulted in the decision to make the components of the offload objective more stringent.

This is a major step in understanding, at a level of detail much greater than prior to the 1981 inception of the Delay Monitoring Program, how the system can be made more tolerant of certain kinds of component failures. This program has yielded a substantial amount of data which is summarized in Figure 28. An example of how the District has utilized the results of this program to improve performance is the removal of vehicle derail bars (PUC authorization granted in July 1986) which had an immediate favorable impact as reflected by reduced rates for train delays, offloads, and gains for dispatches completed and ontime measures. Another example is the new onboard

Figure 27

PEAK PERIOD DELAY EVENTS
7-MINUTE THRESHOLD

FY 1986/87 OBJECTIVE: 2.00

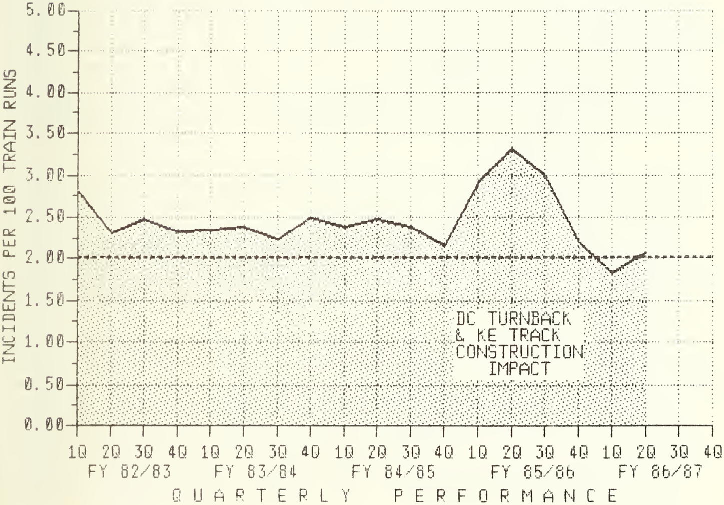


Figure 28

CAUSES OF PEAK PERIOD TRAIN DELAYS

(7-minute delay threshold data are for period Dec 83 - Nov 86)

	Percent of Total Delay Incidents
VEHICLE EQUIPMENT	
Automatic Train Operations	18.2
Propulsion	14.3
Doors	14.0
Friction Brakes	5.9
Auxillary Electric System	4.2
*Trucks	4.1
Other	1.0
SUBTOTAL	61.7%
WAYSIDE EQUIPMENT	
False Occupancy or Routing	4.8
Track Structure & Maintenance	0.5
Computer Outages	0.3
Third Rail Outages	0.3
Station Equipment	0.2
Data Transmission System	0.1
SUBTOTAL	6.2%
OPERATIONAL CAUSES	
**End-of-Line Sweeps	9.9
Late Dispatches	4.0
Early Layups	3.5
Train Operator or Central Errors	2.3
End-of-Line Congestion	1.2
Daly City Spur Movements	1.0
Operational Decisions	0.9
Other	0.7
SUBTOTAL	23.3%
OTHER CAUSES	
Vandalism to Vehicles	1.8
#Construction, KE Track	1.7
##Construction, Daly City Turnback	1.7
Ill Patron	1.0
P.G.&E. Outage	0.7
Vandalism to Wayside Equipment	0.5
Wayside Fires	0.4
Other	1.0
SUBTOTAL	8.8%
GRAND TOTAL	100.0%

*Eliminated with PUC authorization to remove derail bars as of July 1986.

**End-of-Line sweeps eliminated August 1986.

#Automatic train operations restored to KE Track January 1986.

##Service disrupting construction phase completed March 1986.

automatic train control system (ATC) for the C-cars and a similar retrofit for all existing A-cars. The current A-car ATC units comprise the principal cause of service disrupting failures on the system. As such, the reduction of headways to 2.25 minutes with the existing units is not possible where maintaining patron- and train ontime objectives under higher density train operations is considered paramount. The new units are expected to reduce ATC related delays by a factor of 25 to 1. Testing of the new units in the prototype C-cars has yielded very favorable results to date.

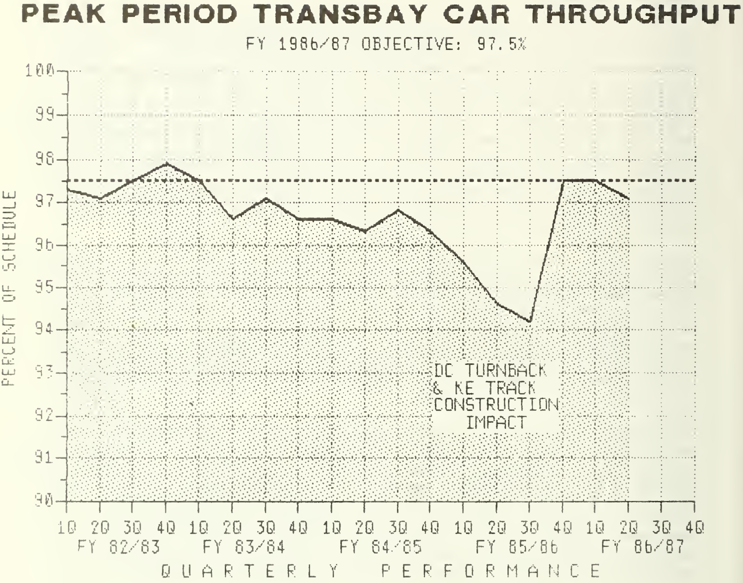
TRANSBAY THROUGHPUT

The transportation corridor between San Francisco and the East Bay serves the heart of the region and is the Bay Area's most heavily traveled. The San Francisco-Oakland Bay Bridge operates at capacity during an extended morning and evening peak period each weekday, and traffic congestion on weekends and holidays can be equally as heavy. BART currently carries 38% of all Transbay trips during peak hours. With the projected increase in jobs and housing on both sides of the Bay, expanding BART service is the most viable and practical way of providing additional capacity in this corridor. This is reinforced by already very limited parking in San Francisco which has led the City to adopt a "transit first" policy emphasizing non-automobile transportation improvements as a means of realizing land-use objectives and preserving the character of downtown and neighborhoods.

To this extent, the Transbay BART link is vital to the region and, as such, is closely monitored in terms of patron flows and train service provided. Peak period Transbay throughput has emerged as a key District indicator which tracks the delivery of capacity relative to schedule. The District has had a long-standing objective to provide a minimum of 97.5% of scheduled Transbay car throughput for peak period service in the peak direction. Thus, if cars are available when needed, trains dispatched per schedule, and delay events held to within acceptable limits, available capacity can be provided as scheduled in this vital corridor.

Figure 29 presents District performance with respect to peak period Transbay car throughput. While performance has generally been within 1 percentage point of the desired 97.5% objective during the 3-year period FY 1982/83 to FY 1984/85, a very noticeable dip occurred in FY 1985/86 as the result of Daly City Turnback and KE Track construction. During this time period, the cars and trains scheduled to make the Transbay crossing either were late or a some were not provided (i.e., operational decisions to avoid delays necessitated early train turnbacks, etc.). Following the completion of this construction, throughput rebounded to the 97.5% objective level.

Figure 29


PEAK PERIOD TRANSBAY CAR THROUGHPUT
FY 1986/87 OBJECTIVE: 97.5%
PERCENT OF SCHEDULE
100
99
98
97
96
95
94
93
92
91
90
DC TURNBACK
& KE TRACK
CONSTRUCTION
IMPACT
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

Maintaining throughput performance is essential for meeting maximum system demand and achieving the District's load factor objective. This will become increasingly more challenging as more trains are added and Transbay headways are reduced from the current minimum of 3.75 minutes to 2.25 minutes (and peak direction service increased from 17 trains per hour currently to 25 trains per hour). The corresponding planned increase in capacity will result in a 59% gain in car throughput during the peak hour (157 cars currently versus 249 cars by mid 1991). This will place additional emphasis on maintaining current reliability standards under higher density train operations to assure the provision of adequate Transbay capacity.

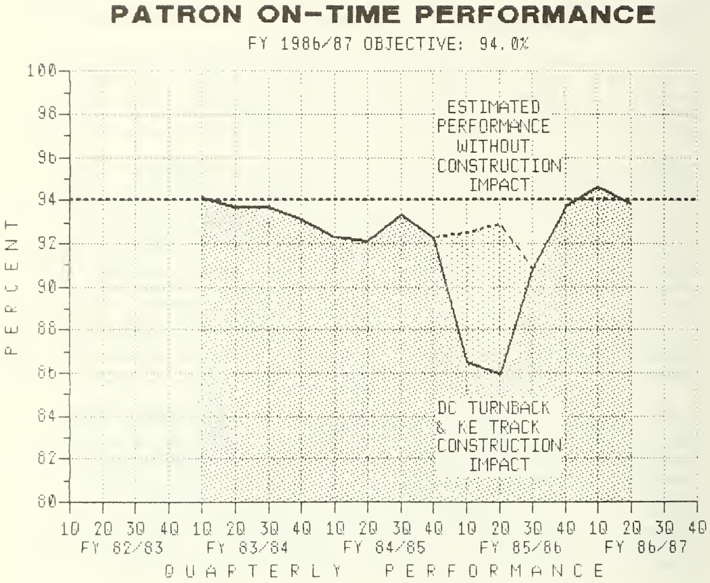
PATRON ONTIME PERFORMANCE

Patron ontime characterizes overall service delivery perhaps better than any other single indicator. Whereas train ontime performance is an accepted industry-wide standard (one which the District also tracks), BART is able to measure the percentage of its riders who travel ontime by means of a system which determines train timetable adherence and the number of patrons affected.

Figure 30 summarizes District performance for the past 3-1/2 years since the inception of the patron ontime monitoring program in July 1983. As shown, patron ontime averaged within 2 percentage points of the 94% objective during FY 1983/84 and FY 1984/85. Construction for the Daly City Turnback and KE Track severely impacted patron ontime performance in FY 1985/86, particularly during the first and second quarters when simultaneous construction for these projects had a compounding effect. More recent performance is very favorable, with patron ontime averaging at the 94% objective level over the last three quarters since completion of the KE Track and subsequent construction phases for the Daly City Turnback ceased to impact operations. This rebound of over 8 percentage points is very important, one that is readily perceived by patrons, and one that reflects the sensitivity of the patron ontime measure to movement for other train performance indicators.

Efforts to improve performance with regard to other train service indicators will be reflected by gains for patron ontime. One example of this is the District's successful efforts to remove vehicle derail bars which required PUC authorization (granted July 1986). This action had an immediate favorable impact on train performance as reflected by reduced rates for passenger offloads and train delays and gains for dispatches completed and train ontime. In view of the experience of the Daly City Turnback and KE Track construction impact on service, the District will need to formulate measures to allow for the phasing in of capacity expansion projects while continuing to provide high quality service as measured by patron ontime performance.

Figure 30


PATRON ON-TIME PERFORMANCE
FY 1986/87 OBJECTIVE: 94.0%
100
98
96
94
92
90
88
86
84
82
80
PERCENT
ESTIMATED PERFORMANCE WITHOUT CONSTRUCTION IMPACT
DC TURNBACK & KE TRACK CONSTRUCTION IMPACT
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

AUTOMATIC FARE COLLECTION SYSTEM

The efficient movement of people on BART also includes consideration of station flows. As the primary mechanism for collecting passenger revenue and travel data, AFC equipment must perform at high standards. Performance of this vital station equipment is essential to ensure unimpeded system ingress and egress. Unavailable faregates or ticket vendors, for example, effectively constrain patron flows and can result in delays due to queing. Since all patrons must use AFC equipment at least twice each trip, the District has identified the AFC incident rate as a key performance indicator. Figure 31 summarizes AFC performance for the past 4-1/2 years. As shown by the horizontal dashed line, the objective is to maintain AFC performance at a rate not to exceed 0.30 incidents per 1,000 trips (this translates to 60 AFC incidents requiring technician assistance per average weekday at 200,000 trips).

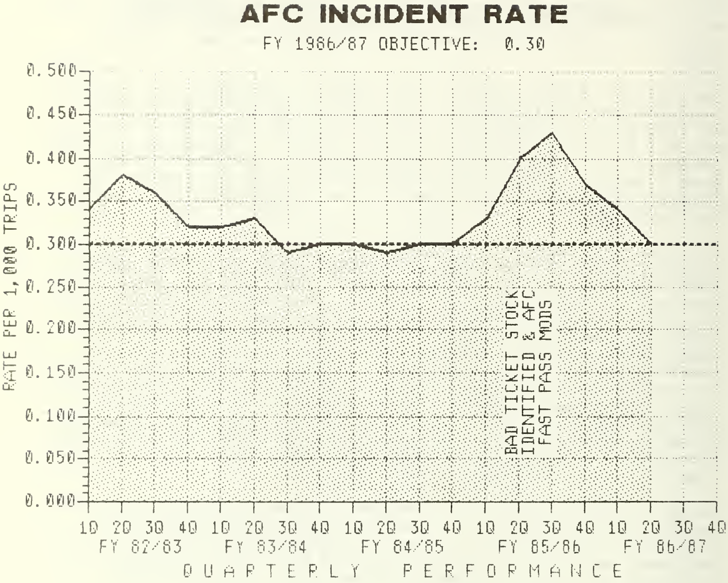
The long-term trend with respect to AFC equipment performance is one marked by steady improvement with the rate dropping from an average of 0.65 incidents per 1,000 trips in FY 1977/78, to 0.35 in FY 1982/83, and to the objective rate of 0.30 incidents per 1,000 trips in FY 1984/85. Component modifications implemented over the years and a program completed in 1985 that optimized usage of the more reliable IBM equipment (versus equipment manufactured by Cubic) by strategically placing them in the most heavily utilized locations, assisted in improving AFC reliability.

While most recent performance is favorable relative to the 0.30 incidents per 1,000 trips objective, two events in FY 1985/86 caused the rate to increase, peaking in the third quarter at 0.43 incidents per 1,000 trips. The first event was the result of the distribution and use of faulty ticket stock which was later identified and remaining batches pulled from circulation (faulty tickets which were already in circulation, however, continued to result in higher than desired AFC incidents). The second event which simultaneously contributed to higher than desired AFC incidents was the modification of all IBM faregates as part of implementing the AC/BART Plus Ticket (which has been in use since February 1, 1987). The stored monetary value of previously circulated faulty tickets has, for all practical purposes, been consumed and AFC equipment tolerances with respect to the faregate modifications have been corrected. As a result, AFC performance has been restored to its previous favorable level of 0.30 incidents per 1,000 trips.

Further assisting in the efficient movement of passengers through stations is favorable performance for elevators and escalators. Modifications to elevators are being implemented as part of improving access for elderly and handicapped patrons (this project is discussed further under "Station Improvements for Elderly and Handicapped Patrons"). Station escalators are also undergoing extensive refurbishment to improve performance (see "Patron Movement" section, below).

Achieving high standards for AFC performance, elevators, and escalators is essential for maintaining smooth and unimpeded passenger flows between train platforms and street levels. The impact of increased ridership on current vital station equipment will also need to be fully examined.

Figure 31


AFC INCIDENT RATE
FY 1986/87 OBJECTIVE: 0.30
RATE PER 1,000 TRIPS
0.500
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
BAD TICKET STOCK
IDENTIFIED & AFC
FAST PASS MODS
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

RIDERSHIP

The historical perspective and recent trends regarding BART ridership were fully discussed in Chapter I and are summarized graphically in Figure 32. This section focuses on BART-controlled service attributes in addition to train performance (i.e., service frequency, reliability, etc.) which also have an impact on system ridership. These non-train performance attributes are used to evaluate District performance in terms of identifying deficiencies, which are translated into a strategic action plan. The discussion is organized on the basis of patron "experiences" that figure into individual decisions of whether to use BART. These patron perceived experiences are:

ACCESS:	The convenience of getting to and from the system in terms of completing a trip from origin to ultimate destination.
STATIONS:	The ease of entering the system and navigating through stations between street and train platform levels.
TRAINS:	The level of comfort and other amenities afforded while onboard trains.

Safety, information availability, and overall system appearance (i.e., cleanliness) figure into these experiences and are discussed under appropriate sections.

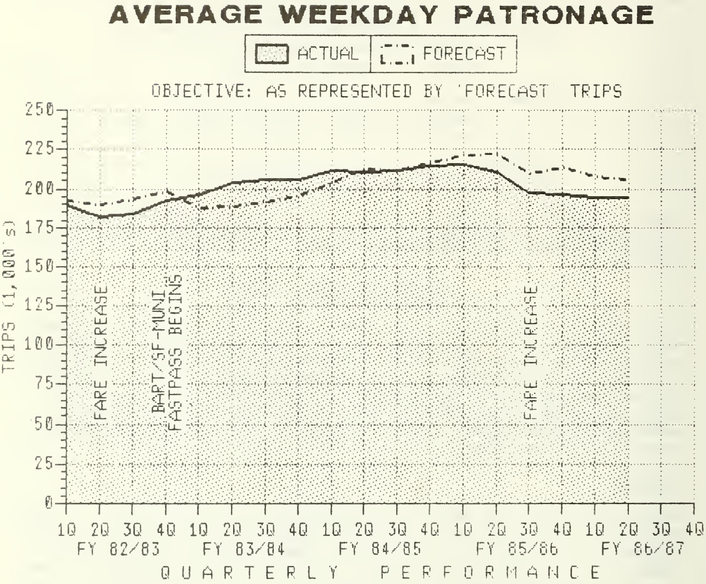
PATRON EXPERIENCE: ACCESS

The District has identified and implemented a variety of access improvements over its almost 15 year operating history. These include additional parking, express bus and shuttle bus service, improved schedule and fare coordination with local transit operators, bicycle storage racks and lockers, a patron carpool preferential parking program, and restrictions on non-patron use of BART parking facilities. The District's access program continues to be multifaceted with emphasis on parking expansion and a range of non-automobile elements as discussed below.

Parking

Past studies have shown BART's potential market to be on the order of 4 to 5 times greater than current actual system usage. This is based on an analysis of population residing within 3 miles of a BART station and traveling more than 5 miles to a work location which is within 1 mile of a station. Highway congestion and auto operating costs, which greatly offset the attractiveness of auto usage, have given rise to questions concerning possible BART access deficiencies and their impact on system ridership. It follows that lack of adequate station parking may be a key factor deterring many would-be BART users. BART currently provides 24,864 paved parking spaces at 24 stations with approximately 96% of these filled by 10 a.m. each weekday. At 20 stations, lack of adequate parking has led to spillover onto local streets. It has been estimated that the system has a parking deficiency of approximately 12,500 spaces relative to the current inventory, a shortage that translates to approximately 25,000 trips per average commute weekday and $10.0

Figure 32


AVERAGE WEEKDAY PATRONAGE
ACTUAL
FORECAST
OBJECTIVE: AS REPRESENTED BY 'FORECAST' TRIPS
TRIPS (1,000's)
250
225
200
175
150
125
100
75
50
25
0
FARE INCREASE
BART/SF-MUNI FASTPASS BEGINS
FARE INCREASE
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

million in potential lost passenger revenue per year. Evidence of the relative importance of parking is further substantiated by the 1985 Passenger Profile Survey which found that 20% of infrequent system users do not ride BART more often because of parking difficulties. Because of inadequate station parking, just over one in four drivers must park on adjacent local streets or in nearby privately operated (paid) parking facilities. A 1986 public opinion poll conducted in Contra Costa County showed that expanded BART parking is the single most widely supported transportation improvement project in the county with a 75% approval rating.

These findings, which are reinforced by concerns of impacted communities, have led to an increased emphasis on parking expansion, particularly for stations in outlying suburban areas where BART access via local transit may be limited or unavailable. Although over 44% more parking is provided now versus when Transbay service first started in 1974, data for BART's Passenger Profile and Latent Demand Surveys and other studies clearly indicate that the gains made over the past 13 years are insufficient to accommodate potential demand and have contributed to the suppression of system usage. To assist in reducing the deficiency, the District will continue to implement its parking expansion program as detailed in Volume II. The plan calls for adding 1,894 paved spaces at existing rail stations in FY 1987/88 and an additional 10,310 spaces in the remainder of the five-year planning period as summarized in Figure 33.

BART Express Bus and Local Transit Access

Local transit is an important mode of access to BART, particularly within the service areas of MUNI and AC Transit, whereas less frequent and less extensive local transit service in outlying suburban areas has resulted in greater reliance on the automobile. BART actively participates in the MTC sponsored Regional Transit Authority (RTA) along with other Bay Area transit operators for the purpose of maximizing patronage and revenues for all systems through the coordination of fares and services. Coordination efforts with AC Transit have resulted in local service revisions to bus routes and schedules. Further, BART continues to fund selected routes operated by AC Transit providing needed access to East Bay rail stations. Efforts to coordinate fares and to implement joint passes are an important aspect of BART's access program (this is discussed in greater detail in the "Fare Payment" section below).

The importance of relieving a portion of the parking pressures at outlying suburban stations has placed added emphasis on coordinating services for BART funded express bus service and also for service provided by Central Contra Costa County Transit Authority. CCCTA has for several years been revising its bus schedules (i.e., arrival and departure times at BART stations) to better match train schedules. This effort is continuing with both CCCTA and AC Transit as the lead agencies. BART has taken the lead in improving coordination of AC operated BART express bus service and train operations. BART's access program calls for continued efforts to coordinate services between local transit and rail operations. This is particularly important with respect to AC Transit which provides access to 20 of BART's 34 stations. During FY 1987/88, BART will pursue improved bus/rail coordination with AC Transit by advocating revisions to bus arrivals and departures at BART stations and making printed bus/rail schedules available to the public.

Figure 33

DECEMBER 1986 BART-OWNED PARKING SPACE INVENTORY AND PROGRAMMED EXPANSION
PAVED FACILITIES AT EXISTING RAIL STATIONS AND EXPRESS BUS PARK/RIDE LOTS

	STATION	SPACES AS OF DECEMBER 1986	PROGRAMMED ADDITIONS JAN-JUN 87	PROGRAMMED ADDITIONS FY 1987/88	PROGRAMMED ADDITIONS FY 88/89 - 91/92	PLANNED SPACES AS OF JUNE 1992
SAN FRANCISCO LINE:	Daly City	1,877	0	0	0	1,877
	Glen Park	55	0	0	0	55
	Oakland West	403	0	0	1,100	1,503
	SUBTOTAL	**2,335**	**0**	**0**	**1,100**	**3,435**
FREMONT LINE:	Fremont	1,983	0	405	0	2,388
	Union City	1,166	0	0	300	1,466
	South Hayward	1,252	0	0	0	1,252
	Hayward	967	0	0	300	1,267
	Bayfair	1,761	0	0	600	2,361
	San Leandro	1,066	0	170	0	1,236
	Coliseum	923	0	0	100	1,023
	Fruitvale	787	0	248	560	1,595
	Lake Merritt	190(a)	0	0	400	590
	SUBTOTAL	**10,095**	**0**	**823**	**2,260**	**13,178**
RICHMOND LINE:	Richmond	754	0	0	100	854
	El Cerrito del Norte	1,607	0	0	840	2,447
	El Cerrito Plaza	509	0	254	0	763
	North Berkeley	524	0	252	0	776
	Ashby	560	0	0	100	660
	MacArthur	609	0	0	640	1,249
	SUBTOTAL	**4,563**	**0**	**506**	**1,680**	**6,749**
CONCORD LINE:	Concord	1,912	0	0	1,100	3,012
	Pleasant Hill	1,678	0	0	1,200	2,878
	Walnut Creek	1,263	0	0	1,270	2,533
	Lafayette	730(b)	0	323	700	1,753
	Orinda	1,047(c)	0	242	500	1,789
	Rockridge	776	0	0	500	1,276
	SUBTOTAL	**7,406**	**0**	**565**	**5,270**	**13,241**
TOTAL: RAIL STATIONS		**24,399**	**0**	**1,894**	**10,310**	**36,603**
BART EXPRESS BUS PARK/RIDE FACILITIES:						
	North Concord/Martinez	0	500	0	0	500
	West Pittsburg	213	0	0	0	213
	Pittsburg	0	0	0	200	200
	West Antioch	0	0	0	200	200
	East Antioch	252	0	0	0	252
	Dublin/Pleasanton	0	0	0	1,400	1,400
	West Livermore	0	0	0	200	200
	Hercules	0	0	0	300	300
TOTAL: EXPRESS BUS PARK/RIDE		**465**	**500**	**0**	**2,300**	**3,265**
GRAND TOTAL: RAIL AND EXPRESS BUS		**24,864**	**500**	**1,894**	**12,610**	**39,868**

(a) A 25¢ parking charge is in effect at Lake Merritt Station. All other BART-owned parking is free.
(b) An additional 403 spaces are provided in a BART-owned gravel lot at Lafayette Station; these will be paved in FY 87/88.
(c) An additional 41 spaces are provided in a BART-owned gravel lot at Orinda Station; these will be paved in FY 87/88.

For express bus operations in FY 1987/88, BART plans call for the introduction of a combined express bus/rail ticket and streamlining service in the West Contra Costa (I-80) and East Contra Costa (SR Route 4) corridors. The District will also retain the 95% ontime performance criterion as part of negotiating a new purchase of service contract for express bus operations.

Elderly and Handicapped Patron System Access

The BART Task Force on Access for Elderly and Handicapped Persons meets regularly with District staff for the purpose of identifying projects which may improve BART accessibility for mobility-, vision-, and hearing-impaired patrons. This includes consideration for access to and from the system, movement through stations, and accommodating special needs onboard trains. Improvements implemented over the years which have enhanced elderly and handicapped patron access to the system include providing wheelchair lift equipped buses for BART express bus service, designating close-in station parking, and ongoing implementation of the District's curb cut program to accommodate patrons in wheelchairs (other projects for stations and onboard trains are discussed in appropriate sections below with additional details provided in Appendix C). Additionally, the District provides system information via TTY/TDD equipment for patrons unable to access BART's telephone information service.

PATRON EXPERIENCE: STATIONS

Convenience is clearly an important factor which enters into an individual's decision concerning mode choice. It follows that the relative ease of using the BART system affects ridership. This section addresses the service qualities which assist patrons in "navigating" through stations, between street-level entry points and train platforms. The discussion focuses on availability of information, fare payment mechanisms, method of assisting patron movement among the various station levels, patron safety and security, and system appearance. The special needs of elderly and handicapped patrons are discussed in a separate section.

Information Availability

The availability of information is an important factor which impacts how easily the system can be used. This is especially critical for first-time users or infrequent riders who may be unfamiliar with fares, routes, schedules, etc. The District has a comprehensive program to disseminate information to patrons through BART published material and public address announcements, station maps and signage, providing connecting local transit schedules (supplied by other operators), and print and broadcast media. Based on the results of the 1985 Passenger Profile Survey, between 20% and 30% of all surveyed riders indicated an importance for having available: train schedules, local bus information, station area maps, and information on how to use BART to get to theatres and other places of entertainment near stations. Less than 4% of the riders surveyed indicated a need to have additional information regarding ticket machine use or how to get around inside stations. Based on this survey and regularly logged consumer complaints, BART's uniform signage system appears to be functioning adequately.

Updates of BART schedule and fare information are available at all stations in addition to brochures which are printed in three languages describing how to use the system and points of interest located near stations. A program to enhance and update the current maps displayed in each station is well underway. The 12th Street Station prototype information panels project is to be completed prior to the close of FY 1986/87 with similar displays to be implemented at other stations (this project is included in BART's 1985/86 Productivity Improvement Program). An additional project, which is to be completed during FY 1987/88, calls for the installation of poster size train schedule signs on the platform level of all stations. Signs for each station will indicate respective train departure times by route for easy reference.

Station agents are also an important source of information and assistance to patrons. In recognition of this, the District has a long-standing objective regarding public contact employee courtesy and helpfulness. Performance is measured in terms of patron complaints about employees and is closely monitored for the purpose of rectifying problems through the District's employee training and counseling program.

Public address system announcements in stations are essential for keeping patrons informed as to train locations, special service, and other service and safety concerns. These announcements assist in maintaining safe patron flows and in the making of patron decisions concerning best (i.e., fastest) routing for trips which may require a transfer or in the case where trains may be delayed. The District will continue to make every effort to keep passengers informed by providing service update announcements, particularly with regard to unanticipated service delays. Transportation behavioral research studies have repeatedly shown that passenger "wait time" is valued more (i.e., perceived to be longer) than "in-vehicle time". Additional emphasis is given to the value of time with respect to work related travel which, for the most part, is schedule oriented. As such, District efforts will be particularly sensitive and responsive to patron information needs during peak commute hours.

Fare Payment

Access to tickets and methods of fare payment directly impact the convenience of using BART. In addition to providing AFC equipment at all stations to vend regular adult tickets, the District has implemented other fare payment mechanisms for added convenience and cost savings to patrons. The District's Tickets-To-Go Program currently includes 194 offsite ticket sales outlets in the three BART District counties and in Santa Clara and San Mateo counties (expansion of the number of offsite ticket sales outlets was included in BART's FY 1985/86 Productivity Improvement Program). This has proven to be an effective means of increasing BART ticket availability while also relieving some of the pressure on station AFC vending equipment. As of December 1986, there were 112 offsite ticket sales outlets consisting primarily of participating branches of banking institutions and retail establishments which sell discounted high value regular adult tickets ($32 tickets for $30) as well as discounted tickets to students and elderly and handicapped persons (90% discount). The remaining 82 offsite outlets include large employers, schools, and community organizations. Discounted tickets are only available at offsite outlets.

The importance of this program has long been recognized. BART's visibility is increased, while at the same time making tickets more easily obtainable and at a discount. In recognition of the mutual benefits to the patron and to BART, the District will continue to pursue expanding the number of offsite ticket outlets.

An improvement for promoting additional ridership by making the system more convenient and easier to use is a combined BART/local transit pass. The combined monthly BART/MUNI pass which first became available in April 1983 provides unlimited use of both systems for travel within San Francisco. In February 1987, the joint AC/BART Plus Ticket was introduced. This latter combined fare payment mechanism functions much as a regular ticket on BART with unlimited use of AC bus service during each semi-monthly period. These two passes eliminate the need for transfers or double fare payment and, together with more coordinated bus/train service, has greatly enhanced the convenience of using BART. Ridership with respect to the BART/MUNI pass has nearly doubled in the past 4 years, from approximately 16,000 average weekday BART trips with this pass during the first year of its availability to over 31,000 average weekday pass trips during February 1987. The availability of these innovative fare payment mechanisms also provides an added incentive to use local transit for access to BART. This is particularly critical for East Bay stations where parking pressures are greatest (refer to the "Parking" section above). To assist in promoting the recently implemented AC/BART pass, the District will be providing special ticket booths at selected San Francisco and Oakland downtown stations beginning May 1987.

Patron Movement

The importance of maintaining unimpeded station pedestrian flow was emphasized above with respect to performance for the automatic fare collection system consisting of entry/exit gates, ticket vendors, change machines, and add-fare machines. In addition to this vital station equipment are escalators and elevators which assist in the movement of patrons among the various station levels (i.e., street level, concourse, and train platform). Availability of escalators and elevators is particularly important with regard to elderly and handicapped patrons, many of whom may not be capable of negotiating stairs (additional details for elderly and handicapped patron movement through stations are presented in a separate section below).

The District recognizes the special maintenance requirements of exterior escalators which are exposed to the weather. The escalator refurbishment program is the result of this and is currently underway with its completion scheduled for February 1990. Key component parts are being replaced and the speed of selected units slowed by 25% in order to improve reliability. The "downtime" for each unit under this program is typically 6 to 10 weeks with no more than 6 units out for refurbishment at any one time systemwide. While escalator performance has been favorable relative to the District's availability objective, this relatively lengthy downtime for refurbishment has contributed to increased patron complaints.

BART will be scheduling the removal of escalators from service for this program in a way to minimize patron inconvenience. The FY 1987/88 availability objectives for escalators and elevators are more stringent relative to prior years, in recognition of the need to maintain high performance for this equipment. Additionally, the District will be working with the cities of San Francisco and Oakland for the purpose of seeking revisions to existing local ordinances prohibiting the enclosure of subway station entrances, which is an effective means of improving escalator performance for exposed units.

Safety and Security

BART ridership is also influenced by individual perceptions and experiences concerning the system's safety and security. BART's record in this extremely important area of operations is very favorable relative to other modes and U.S. rail systems. As of February 1987 BART has carried 597.2 million passengers 7.8 billion passenger miles without a single patron fatality. The number and types of patron accidents have remained fairly constant over the years with those occurring in stations averaging 55 to 65 per month. Slips and falls on stairways and escalators constitute approximately 75% of all reported patron accidents (the remaining 25% are related to train operations, and are discussed under Train Safety and Security, below).

Patron safety has always been of paramount concern to the District. As such, facilities and operations planning are performed in concert with BART's Safety Department to assure adherence to accepted industrywide safety standards. Numerous improvements have been made in BART's almost 15-year operating history in addition to the safety features included in the system's original design. These include modifications to vehicles, stations, right-of-way protection, and parking areas. Further, the experience of the 1979 Transbay Tube fire and follow-up investigation provided BART and the entire transit industry with greater insight regarding emergency preparedness and life safety. The recommendations of this investigation were incorporated into an aggressive program to improve the safety of facilities and operations even further. Major projects include the replacement of all vehicle seat cushions and covers with low-smoke/flame-resistant material and the fire hardening of all vehicles.

Equally as important has been the 1981 publication of an extensive and detailed emergency plan for BART which was developed in cooperation with local emergency service agencies. This has led to improved communications coordination and a better understanding of the BART system on the part of local fire departments and other emergency service providers. BART facility tours and drills are conducted on an on-going basis to assure proper emergency response for critical situations at all system locations.

The capability to evacuate patrons safely from BART stations has also been analyzed. As a result of this effort, two new platform-to-concourse stairways will be constructed at both ends of Embarcadero Station.

Similar consideration is given to patron security. The establishment of BART Police Services prior to the start-up of revenue operations in September 1972 was an early recognition of the District's special security requirements. Patron security has subsequently been emphasized throughout BART's planning and operational history. The effective deployment of BART police is the prime strategy for combatting crime on trains, in station areas, and along track rights-of-way. Computer programs for tracking and dispatching police officers will continue to be used, as well as other information systems for the accurate and timely reporting of crime data.

Station Appearance

Concern for system cleanliness is reflected in the relative absence of graffiti and overall favorable appearance of BART facilities. This enhances the system's appeal in terms of the patron's experience and, therefore, contributes towards promoting additional ridership. The District's maintenance program for cleanliness is routinely monitored and reported to management and the Board of Directors along with other areas of performance. Regular inspection of station facilities and trains (vehicle cleanliness is discussed in the "Trains" section below) has assisted BART in achieving its established cleanliness standards. This program is to remain in place, assuring that the system's favorable appearance is maintained.

Station Improvements for Elderly and Handicapped Patrons

Prior to the start-up of revenue service in September 1972, the system was retrofitted to accommodate special needs of persons in wheelchairs or with other mobility impairments. Numerous additional station improvements have been made over the years including installation of elevators, electronically controlled doors, special ramps, raised markers and railings on platforms, and restroom modifications. These and other improvements in parking lots and on trains have been implemented primarily as the result of deficiencies which were identified by the BART Task Force on Access for Elderly and Handicapped Persons.

More recent efforts to improve elderly and handicapped patron mobility within stations are being addressed by two important projects. The first is the elevator improvement project which includes installation of elevator-call card readers, intercoms, closed circuit television, new call buttons, and lowering of control panels. These enhancements have been installed in prototype form for elevators at Berkeley and El Cerrito del Norte stations. Plans call for completing 75% of installations by June 1988 and the balance in FY 1988/89.

The second project, platform edge detection, addresses movement through stations for vision-impaired patrons. Plans call for completing installation of brightly colored and textured tiles along all station platform edges by June 1988.

Further facilitating elderly and handicapped patron movement through stations is the availability of BART tickets at local banking institutions, retail establishments, senior citizen centers, and other social service organizations. In addition to providing a 90% discount to qualified individuals, the offsite purchase of tickets allows elderly and handicapped patrons to by-pass ticket vendors and change machines.

PATRON EXPERIENCE: TRAINS

Concern for patron experience onboard trains encompasses: information availability, load factors, safety and security, appearance, and special needs for elderly and handicapped patrons.

Information Availability

Train operator announcements are an important means of communicating information to on-board passengers concerning service and safety. This aspect of train operations is routinely monitored in the District's Passenger Services Sampling Survey which focuses on announcements regarding: station arrival, transfer points, and service delays. Additional information is available in the form of schematic system maps which are located at each side door on all cars. Patrons may also contact the train operator via the onboard intercom system located in all cars.

Load Factors

Perhaps the foremost aspect of patron onboard experience (one which directly impacts ridership) is train occupancy as measured by the ratio of passengers to seats, or load factor. This measure was fully discussed in Chapter I in terms of peak period ridership growth and BART's limited capability to reduce train loadings until additional capacity becomes available. While load factors have declined somewhat with reduced levels of ridership over the past year, regional travel projections suggest that higher train occupancy is definitely in BART's future. Further, the new C-cars, which will start arriving in July 1987, cannot be fully utilized until key capacity expansion projects are completed and headways reduced. The next headway reduction to 3 minutes 10 seconds is currently scheduled to take place in September 1988. Until that time, the District will make every effort to balance peak period load factors across all four routes.

Safety and Security

Onboard patron security is addressed by the effective deployment of BART police. As stated previously, the District will continue surveillance of trains, stations, and other BART property.

The level of patron accidents onboard trains has remained fairly constant over the years. Typically 15 to 20 accidents occur each month. Three-fourths of these involve falls onboard trains, being struck by car doors, and gap falls (i.e., the 2 to 3 inch space between the vehicle floor and the station platform). Train operator announcements regarding door closure and care when entering and exiting trains will continue to assist in minimizing these types of accidents.

The introduction of higher frequency BART service is linked to adherence to stringent safety design criteria. The removal of the PUC subway vent separation requirement, now scheduled to take place in October 1987, is one important safety related step needed for achieving expanded capacity. The August 1986 completion of the District's fire hardening program is a key element and prerequisite for PUC approval. Other improvements implemented to date include the installation of emergency procedure posters on all cars, additional hand rails, replacement of all seat cushions and covers with low smoke/flame resistant material, and routinely scheduled safety drills involving local emergency service providers (a minimum of one drill each month is conducted).

Train Appearance

Interior and exterior cleaning is performed in the three East Bay yards. Routine monitoring and reporting of performance has assured the achievement of the District's established standards for car cleanliness. Continued efforts to achieve high standards will further enhance the life of BART's A- and B-car fleet which is approaching 15 years of age. Additionally, maintaining stringent car cleanliness standards will ensure that the service provided by the A- and B-cars is on par with the new C-cars.

Vehicle Improvements for Elderly and Handicapped Patrons

In addition to the above, the special needs of elderly and handicapped patrons have led to the installation of signs on all cars indicating priority seating for mobility-impaired persons. The District is also providing additional space for patrons in wheelchairs on the C-cars (see Appendix C for additional details).

FINANCIAL PERFORMANCE

BART financial performance is directly linked to system productivity, a critical aspect of operations and capital planning which is in the forefront of management concerns. The District's participation in the MTC sponsored Regional Transit Productivity Committee has assisted in the identification of projects and programs to improve operational efficiency and productivity. Prior year Productivity Improvement Program (PIP) submittals to MTC reflect the District's efforts to continue to improve performance (see Figure 34 for the status of BART's FY 1985/86 PIP, the last submittal prior to MTC's revisions of this program).

BART financial performance can be expressed in terms of the operating cost of delivering service versus revenue returns. As seen in Figure 35, BART's cost per car mile in constant 1977/78 dollars declined significantly between FY 1977/78 and FY 1980/81, and has remained fairly stable since the start up of 4-route close headways service in mid 1980. The cost per passenger experienced a similar decline, which continued through FY 1984/85 reflecting increased ridership. The slight upturn for the cost per passenger beginning in FY 1985/86 corresponds to reduced levels of ridership for that period.

Figure 36 presents District productivity in terms of car mile output versus the cost per passenger mile which is expressed in constant 1977/78 dollars. Compared to the previous figure (which presents ridership and expense), a similar pattern of productivity is apparent: significant gains between FY 1977/78 and FY 1981/82, stable performance between FY 1981/82 and FY 1984/85, and an unfavorable turn beginning in FY 1985/86. This latter unfavorable

FIGURE 34

STATUS FOR BART'S 1985 PRODUCTIVITY IMPROVEMENT PROGRAM OBJECTIVES

(As of February 1987)

PIP ELEMENT	FY 1985/86 OBJECTIVE*	FEBRUARY 1987 STATUS
Comprehensive Marketing Program	Average Weekday Offpeak Trips (109,600)	98,020 (for month of February 1987)
(Short-Term)	Average Saturday Trips (89,800)	88,184 (for month of February 1987)
	Average Sunday Trips (51,600)	44,318 (for month of February 1987)
	Rail operating cost per passenger mile (18.5¢)	21.2¢ (YTD July 1986 - February 1987)
	Rail farebox ratio (43.0%)	51.9% (YTD July 1986 - February 1987)
	Rail passenger revenue per seat-mile (3.3¢)	3.4¢ (YTD July 1986 - February 1987)
	Offsite ticket sales outlets -- number by year end (168)	194 as of the end of December 1986 (112 retail and bank outlets; and 82 school, employer, organization outlets)
Capacity Expansion Program	**Targeted Project Completion Dates and Milestones for the Following Projects**	
(Long-Term)	KE Track (November 1985), project complete by November 1985	KE Track completed and operational in March 1986.
	New ATC Prototype (October 1985) Production release by October 1985	Progress continues concurrently with C-Car testing and production.
	Vehicle Fire Hardening (September 1986), Complete 420 Cars by June 1986	Entire operating fleet of 437 cars fire hardened as of August 1986.
	Integrated Control System, Phases I & II (Phase I = January 1987, Phase II = December 1987), complete software production by April 1986	Project reconfigured. Estimated completion is October 1989.
	Second Generation Transit Vehicles (schedule under review), prototype delivery by August 1985	Prototype cars delivered in October 1985. Delivery of production cars to begin June 1987 with the receipt of the last of 150 cars by December 1988.
	Daly City Turnback (December 1987), complete civil construction by April 1986	Civil/structural construction work is 98% complete.
	Daly City Yard (March 1988), complete design by November 1985	Design complete. Notice to proceed with civil/structural contract. Excavation has begun.

* Objectives are consistent with those reported to the RTPC in September 1985 based on the District's Draft FY 1985/86 Budget.

Figure 35

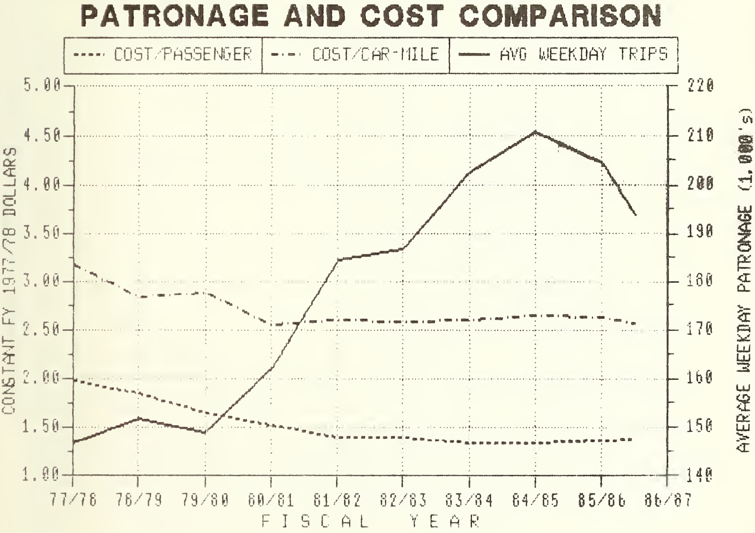
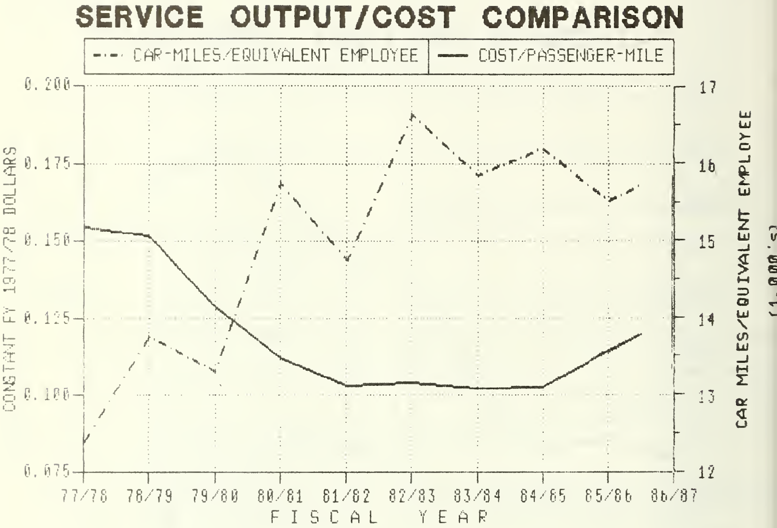

PATRONAGE AND COST COMPARISON
COST/PASSENGER
COST/CAR-MILE
AVG WEEKDAY TRIPS
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
CONSTANT FY 1977/78 DOLLARS
220
210
200
190
180
170
160
150
140
AVERAGE WEEKDAY PATRONAGE (1,000's)
77/78
78/79
79/80
80/81
81/82
82/83
83/84
84/85
85/86
86/87
FISCAL YEAR

Figure 36


SERVICE OUTPUT/COST COMPARISON
CAR-MILES/EQUIVALENT EMPLOYEE
COST/PASSENGER-MILE
CONSTANT FY 1977/78 DOLLARS
0.200
0.175
0.150
0.125
0.100
0.075
CAR MILES/EQUIVALENT EMPLOYEE
(1,000's)
17
16
15
14
13
12
77/78
78/79
79/80
80/81
81/82
82/83
83/84
84/85
85/86
86/87
FISCAL YEAR

movement for the cost per passenger and car mile output reflects below forecast ridership and concurrent shortening of train lengths (hence, fewer car miles) to meet the District's load factor objectives.

This constant dollar comparison presents BART productivity in real terms with the impact of inflation factored out. Gains made in the period between fiscal years 1977/78 and 1984/85 are solid evidence of BART productivity prior to the ridership downturn in FY 1985/86. The most recent productivity downturn places additional emphasis on the need to evaluate new ways of generating and allocating resources, as well as stimulating ridership and revenue growth. This section of BART's Five Year Plan looks at past and current performance in light of key financial indicators and presents the District's strategy for realizing these gains.

Three measures which best indicate overall financial performance and which are tracked on a monthly basis by the District are:

RAIL FAREBOX RATIO: The expense of delivering rail service versus the return in rail passenger revenue.

SYSTEM OPERATING RATIO: The expense of delivering rail and District funded express bus and other contract bus services versus the return in passenger fares and non-passenger revenue.

RAIL COST PER PASSENGER MILE: The expense of delivering rail service versus system usage as expressed by passenger miles.

Quarterly performance for the past 4-1/2 years relative to these key indicators is presented in Figures 37, 38, and 39. Common to all three is consistently favorable performance up to about the third quarter of FY 1984/85. BART's record since then has been mixed, with performance during FY 1985/86 clearly unfavorable to budget reflecting below forecast ridership and revenues. Favorable performance returned during the first two quarters of FY 1986/87. With passenger revenue for the first half of FY 1986/87 running 6.2% below budget, this latter favorable return reflects the District's efforts to control costs. Opportunities for realizing additional productivity gains lie within the District's ability to continue to keep expenses in line while increasing ridership and passenger revenue.

Three primary expense components which constitute approximately 87% of the District's annual operating budget are labor (65%), electric power (13%), and contract bus services (9%--which includes District funded express bus service, shuttles, and transfer payments). Opportunities for realizing greater economies and efficiencies within any of these major expense areas are important for improving productivity and overall financial performance. Staffing costs comprise the largest component of total operating expense. While this may decline somewhat if electrical energy assumes a larger proportion, staffing cost is the one factor most directly under District control. Staffing levels materially affect labor cost, and to the extent that

Figure 37

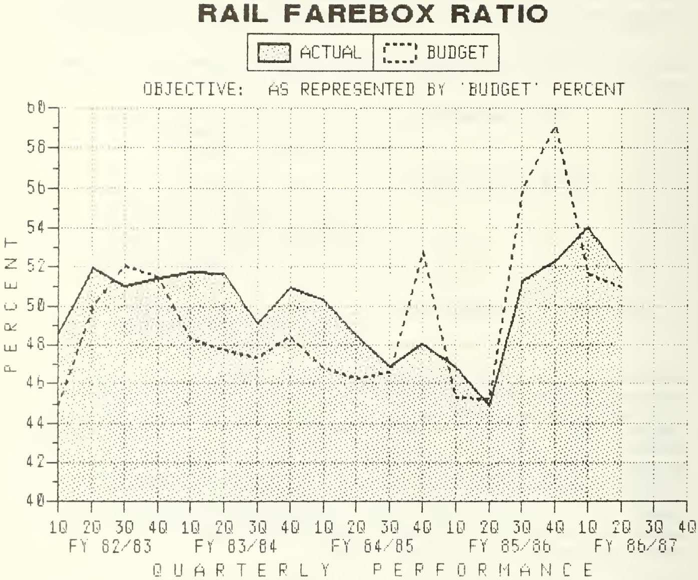

RAIL FAREBOX RATIO
ACTUAL
BUDGET
OBJECTIVE: AS REPRESENTED BY 'BUDGET' PERCENT
60
58
56
54
52
50
48
46
44
42
40
PERCENT
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

Figure 38

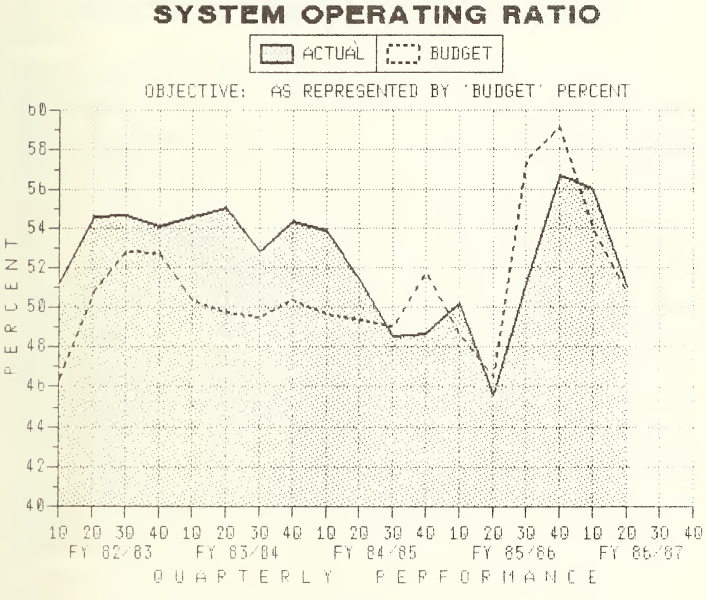
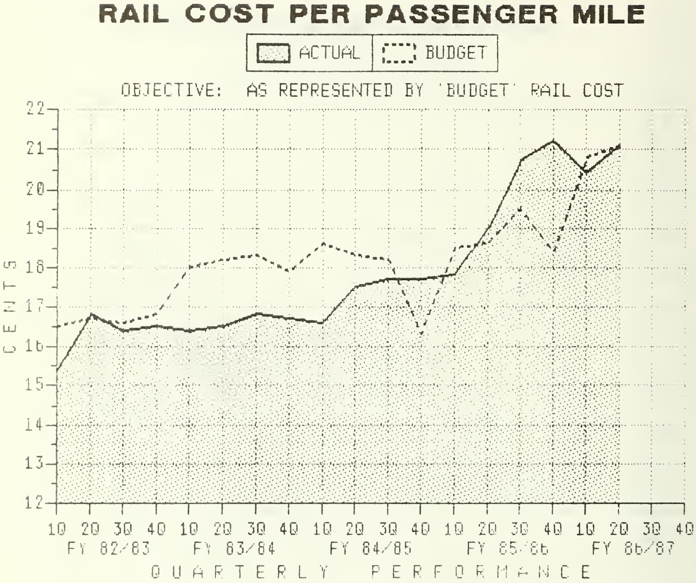

SYSTEM OPERATING RATIO
ACTUAL
BUDGET
OBJECTIVE: AS REPRESENTED BY 'BUDGET' PERCENT
PERCENT
60
58
56
54
52
50
48
46
44
42
40
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

Figure 39


RAIL COST PER PASSENGER MILE
ACTUAL
BUDGET
OBJECTIVE: AS REPRESENTED BY 'BUDGET' RAIL COST
22
21
20
19
18
17
16
15
14
13
12
CENTS
1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q
FY 82/83
FY 83/84
FY 84/85
FY 85/86
FY 86/87
QUARTERLY PERFORMANCE

output can be increased without proportional increases in staffing, future labor cost increases can be held within the limits of available resources. In support of this are District efforts to maximize employee productivity through control of paid sick leave and lost time due to industrial injuries. As such, the current level of staffing is expected to absorb a portion of the increased work load demands brought on by the phasing in of expanded service. This is particularly relevant with respect to administrative staffing. Increased efficiency and economy of scale are anticipated with regard to maintaining an expanded fleet. Use of the new C-cars in conjunction with the Daly City Yard with reduced maintenance labor requirements due to fewer car miles per car (i.e., more efficient train sizing and storage) is central to this effort. Administrative functions are expected to be performed with only minor staffing increases.

The majority of new positions will be required in response to operating and maintaining more trains and more cars. Minor increases will be required, particularly for revenue processing and BART police, due to higher patronage. Relative to today, the current service plan is to increase peak period Transbay capacity by 38% by June 1992 and to increase average weekday ridership by 19% to 233,700 trips also by June 1992. This will require only a 9.3% increase in average weekday car miles, which is a key determinant of electric power and maintenance expense. These productivity gains are expected with the addition of 148 full time equivalent positions to BART's current workforce. Additional details concerning BART staffing levels and labor expense are presented in Chapter III of this volume.

Electric power and contract bus service are the two major non-labor components of the District's operating budget. Enhanced operational flexibility with the C-cars and Daly City Turnback and Yard are expected to substantially reduce electric power even though higher service levels are to be provided. This savings is the direct result of more efficient online train sizing with the C-cars and the use of the Daly City Yard for the storage of a portion of BART's fleet not needed during offpeak service. The Daly City Yard will also be used for some overnight storage of trains. Thus, midday and overnight storage of vehicles represents a substantial savings to the District in terms of power cost due to reduced car miles relative to current operations.

The savings to be realized is dependent upon optimum use of the new C-cars and the Daly City Yard. C-car planning is currently underway, and is the principal effort for formulating operational strategies which will enable BART to meet its load factor objective (i.e., provide adequate capacity to meet demand) while minimizing car miles.

In addition to the savings expected with the C-cars and Daly City Yard, the District is also in the process of investigating the possibility of procuring electric power at more favorable rates from sources other than from Pacific Gas & Electric.

Expense for purchased bus transportation (i.e., District funded express bus service, shuttles, and transfer payments) has increased 130% over the past 5 years, from a budget of $6.7 million in FY 1981/82 to $15.4 million in FY 1986/87. Part of this increase reflects the additional feeder service expense first negotiated with AC Transit for FY 1984/85. This initial agreement took effect in October 1984 with $3.1 million BART funds supporting 9 months of AC provided feeder bus service. This component of purchased transportation has increased substantially to $7.1 million for the FY 1986/87 budget.

As part of its policy on privatization (see Appendix B), the District will continue to pursue cost reductions for purchased bus transportation, as well as for other areas of operations relating to the purchase of supplies, equipment, and services. Privatization is closely linked to the District's Joint Development Program which focuses on promoting higher density land uses in the vicinity of BART stations. Joint development efforts have resulted in private sector development proposals including hotel/office complexes at Concord, Pleasant Hill, and Fremont Stations, and an office structure at Lake Merritt Station. This effort is important as a means of expanding BART's financial base through the realization of additional revenue from ground leases and air rights of District property. Increased development near stations will also result in an expansion of the market for BART service, thus yielding higher patronage and revenues. BART's joint development efforts support regional land-use goals which emphasize the development of existing centers, preservation of open space, and use of transit. Privatization and joint development are also linked to the District's affirmative action program. Specific activities for these programs are called out in the District's objective set shown in Figures 41 and 42.

PROGRAM AREA OBJECTIVES

Five-year parameters for system operations are summarized in Figure 40. In support of efforts to increase ridership, improve productivity, and expand its financial base, the District will strive to achieve its adopted program area objectives for the upcoming 1987/88 fiscal year. These objectives are presented in Figure 41. Objectives for the four out years in the current five year timeframe are presented in Figure 42.

Figure 40

1987 BART FIVE YEAR PLAN OPERATING PARAMETERS AND FORECASTS

	BUDGETED	F O R E C A S T			
SERVICE DELIVERY	FY 1987/88	FY 1988/89	FY 1989/90	FY 1990/91	FY 1991/92
Minimum Scheduled Headway (min:sec)*	3:45**	3:10	2:30	2:15	2:15
Peak Period Trains Online*	45	48	50	54	54
Peak Period Cars Online*	365	396	400	426	452
Car Hours (1,000's)	1,103	1,151	1,113	1,155	1,208
Car Miles (1,000's)	30,203	31,516	30,499	31,631	33,083
PATRON RESPONSE					
Total Passenger Trips (1,000's)	58,369	60,773	62,731	64,969	67,327
Average Weekday Trips (1,000's)	201	210	217	225	234
Passenger Miles (1,000's)	733,600	762,701	787,274	815,361	844,954
FINANCIAL RESULT					
Total Operating Expense (1,000's)	$171,810	$187,320	$199,340	$211,341	$223,742
System Operating Ratio	49.9%	47.3%	45.6%	44.5%	43.5%
Rail Farebox Ratio	50.2%	48.2%	46.6%	45.4%	44.3%
Rail Cost Per Passenger Mile	21.3¢	22.4¢	23.2¢	23.8¢	24.4¢
DISTRICT STAFFING					
Headcount#	2,364.5	2,453.5	2,482.5	2,502.5	2,513.5

---

*Maximum service level programmed during respective fiscal years.

**Except for 3:00 headway during peak 15 minutes.

#Includes capitalized and other reimbursable positions as of June each fiscal year.

Figure 41

BART OBJECTIVES FOR FY 1987/88

Program Area A: BASIC SYSTEM SERVICE AND CAPACITY

1. Balance capacity where possible such that load factors for peak period trains which can be lengthened or shortened (consists between 3 and 10 cars) are relatively equal but not less than 1.00, and provide offpeak service such that no train load factor exceeds 1.05.

2. Operate weekday peak period Transbay service in the peak direction providing at least 98.0% of scheduled train throughput and 97.5% of scheduled car throughput on a monthly average basis.

3. Make available 106 A-cars and 272 B-cars for revenue service by 4 AM.

Program Area B: RELIABILITY

1. Complete 99% of all scheduled dispatches.

2. Conduct operations such that 95% of daily terminal-to-terminal runs are completed within 5 minutes of scheduled run times with at least 93% during AM and PM peak periods for commute days.

3. Provide service such that no more than 2% of peak period trains experience a primary delay exceeding 7 minutes and no more than 6% experience a delay from any cause exceeding 7 minutes.

4. Conduct operations such that 94% of all patron trips are completed on-time. All patron trips are on-time when trains run not more than 5 minutes late or 60 seconds early.

5. Provide service such that passenger offload rates remain at or below the following: vehicle equipment = 1.00; wayside equipment = 0.08; operations and other = 0.40; and the total = 1.48 (per 1,000 car hours).

6. Maintain the overall AFC technician maintenance incident rate at or below 0.30 incidents per 1,000 passenger trips, and maintain or exceed a 6 AM average weekday availability rate of 95% for entry/exit gates and 90% for ticket vendors.

7. Maintain a 6 AM average weekday availability of 98% for elevators and 95% for escalators.

8. Maintain express bus on-time performance such that 95% of all runs arrive at their final destination within 5 minutes of schedule.

Figure 41 (Continued)

BART OBJECTIVES FOR FY 1987/88

Program Area C: SAFETY AND SECURITY

1. Continue to provide an environment for patron circulation through trains and stations such that the accident rate does not exceed 17.7 per million passengers.

2. Reduce the total annual amount of employee lost time due to injuries as a percent of time worked to 0.50% or less.

3. Conduct a minimum of one emergency plan exercise per month involving emergency response agencies.

Program Area D: PATRONAGE AND TRAVEL PROMOTION

1. At a minimum, achieve normal growth projections for average daily patronage as follows (in 1,000's):

	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	FY 87/88
Average Weekday:	199.2	201.0	199.0	204.6	201.1
4-hour Peak:	96.2	99.8	98.3	100.6	98.8
Offpeak:	103.0	101.2	100.7	104.0	102.3
Saturday:	80.0	88.0	82.0	84.0	83.5
Sunday:	48.3	48.6	48.9	49.1	48.7

2. Maintain at least 150 offsite ticket outlets at banks and retail establishments available to the general public, in addition to employer distribution program, with adequate coverage throughout the District.

Figure 41 (Continued)

BART OBJECTIVES FOR FY 1987/88

Program Area E: FINANCIAL AND OPERATIONAL EFFICIENCY

1. Maintain a funded budget and farebox ratios of no less than 10.3% for BART express bus operations, 50.2% for rail operations, and 46.1% for system-wide operations.

2. Maintain a system operating ratio of no less than 49.9%

3. Maintain a rail cost per passenger mile of 21.3¢ or less.

4. Achieve a level of service output such that 15,000 vehicle miles are produced per equivalent District employee (based on 2,000 hours worked, including overtime and excluding capitalized labor).

5. Improve system utilization (passenger miles per seat mile) to 33.7% through continued monitoring of train capacity to match passenger demand patterns.

6. Maintain a paid sick leave rate of no more than 3.5% (9.1 paid days) annually per employee.

7. Transmit key performance reports to the Board of Directors, Department Managers, and/or other recipients within the following number of working days after the close of each reporting period: Monthly Patronage Report (10), Monthly Budget Performance Report and Quarterly Affirmative Action Report (15), Quarterly Financial Statements (25), Quarterly Performance Report on System Objectives (35), Quarterly Operations Performance Report (45), and the Annual Report (75).

8. Reduce the number of District objectives by 25%.

Program Area F: AFFIRMATIVE ACTION

1. Work to increase the workforce representation of women and minorities into targeted job categories from 20.0% in June 1986 to 22.1% by June 1988 in accordance with the 1987/91 Affirmative Action Plan.

2. Work to achieve 21% minority business enterprise participation for all District contracts determined to have MBE opportunities, with 18% DBE and 3% WBE participation for federally assisted contracts.

3. Work to achieve not less than 15% equity participation in District Joint Development Projects by women and minority individuals and/or business enterprises.

Figure 41 (Continued)

BART OBJECTIVES FOR FY 1987/88

Program Area G: SYSTEM ACCESS

1. Provide 1,894 new BART-owned paved parking spaces at existing rail stations.
2. Acquire funding for Pleasant Hill Station parking structure and initiate engineering design.
3. Initiate engineering design of Concord Station parking structure.
4. Advocate achievement of __% of BART/AC bus connections with coordinated schedules. (Level to be determined jointly with AC Transit as part of its route restructuring program).
5. Implement streamlining in the West and East Corridors.
6. Implement Express Bus/Rail ticket.
7. Complete 75% of station elevator conversions.
8. Complete platform edge installations at all stations.

Program Area H: JOINT DEVELOPMENT

1. Complete station area plans at Concord and MacArthur Stations, assuming local government cooperation.
2. Initiate station area planning process at Bayfair, El Cerrito del Norte, and El Cerrito Plaza Stations.
3. Assuming favorable market conditions, negotiate an acceptable ground lease agreement at at least one of the above sites.

Program Area I: EXTENSIONS

1. Complete the Fremont-South Bay Corridor Alternatives Analysis/Draft Environmental Impact Report.
2. Complete acquisition of at least three extension sites.
3. Complete the Pittsburg-Antioch Corridor Alternatives Analysis/Draft Environmental Impact Statement/Draft Environmental Impact Report.

Figure 42

BART OBJECTIVES FOR FY 1988/89 THROUGH 1991/92

Program Area A: BASIC SYSTEM SERVICE AND CAPACITY

- Operate 4-route weekday service with the capability of providing sustained 3 minute 10 second-headways by September 1988 following the completion of the Daly City Turnback reducing to 2 minutes 30 seconds by September 1989, and 2 minutes 15 seconds by September 1990 following the completion of remaining capacity expansion projects.

- Support the following weekday car requirements (as of the fourth quarter of each fiscal year):

Service Requirements	1989	1990	1991	1992
A-Cars	100	78	92	114
B-Cars	271	256	268	272
C-Cars	82	128	128	128
TOTAL	453	462	488	514
Service Distribution				
On-Line	396	400	426	452
Spares	57	62	62	62
TOTAL	453	462	488	514
Total Fleet				
A-Cars	135	135	135	135
B-Cars	303	303	303	303
C-Cars	96	150	150	150
TOTAL	534	588	588	588

Program Area B: RELIABILITY

- At a minimum, maintain current reliability objective level performance under higher density train operations.

Program Area C: SAFETY AND SECURITY

- Maintain current levels of patron and employee safety as measured by the patron accident rate and lost-time injury rate objectives.

Program Area D: PATRONAGE AND TRAVEL PROMOTION

- Maintain acceptable quality of service as reflected by accuracy of service announcements, employee helpfulness, and station cleanliness in support of achieving the following patronage levels (in 1000's):

	FY 88/89	FY 89/90	FY 90/91	FY 91/92
Average Weekday:	210,192	217,158	225,198	233,691
4-Hour Peak:	105,363	109,690	115,027	120,762
Offpeak:	104,829	107,468	110,171	112,929
Saturday:	85,603	87,758	89,965	92,217
Sunday:	49,937	51,194	52,482	53,795

- In addition to FY 1987/88 offsite ticket outlets, increase the number of outlets by 25 each fiscal year.

Figure 42 (Continued)

BART OBJECTIVES FOR FY 1988/89 THROUGH 1991/92

Program Area E: FINANCIAL AND OPERATIONAL EFFICIENCY

- Continue to provide cost-effective and efficient service through the achievement of key financial and operational efficiency objectives.

Program Area F: AFFIRMATIVE ACTION

- Work to increase the workforce representation of women and minorities into targeted job categories from 22.1% by June 1988 to 28.7% by June 1991 in accordance with the 1987-1991 Affirmative Action Plan.

Program Area G: SYSTEM ACCESS

- Complete parking redesign and surface parking projects.
- Complete parking facilities at Pleasant Hill and Concord.
- Complete Daly City Intermodal Facility.
- Complete park/ride lots in Dublin/Pleasanton, West Livermore, West Antioch, Pittsburg, and Hercules.
- Continue streamlining express bus service.
- Complete remaining 25% of station elevator conversions.

Program Area H: JOINT DEVELOPMENT

- Continue station area planning efforts in preparation for marketing specific sites for development.
- Market specific sites as market conditions and local plans permit.

Program Area I: EXTENSIONS

- Continue to implement the Extension Right-of-Way Acquisition Program.
- Complete the Alternatives Analysis and Final Environmental Impact Requirements for Phase I of the BART Extension Staging Policy.

CHAPTER III

FIVE YEAR
OPERATING FINANCIAL PLAN

Given the foregoing identification of specific performance objectives for the five-year period, it is the purpose of this chapter to identify the financial requirements for implementing proposed improvements and service expansion, to highlight problems limiting implementation, and to recommend feasible solutions in the form of a five-year financial plan.

The District's five-year operating budget projections (Figure 43) are based on the tentative FY 1987/88 budget.

FY 1987/88 OPERATING BUDGET

The tentative operating budget for FY 1987/88 has been developed to meet the previously described goals and objectives. Year-to-year comparisons below are in terms of the adopted FY 1986/87 budget. However, because operating revenues and financial assistance are significantly below budgeted FY 1986/87 levels, estimated/actual FY 1986/87 figures are also shown.

The budget anticipates net fare revenues of $79.2 million with a rail farebox ratio of 50.2%, and other operating revenues of $6.5 million, resulting in an operating ratio of 49.9%.

Property Tax receipts are estimated at $7.6 million, and Sales Tax receipts are forecast at $89.1 million.

Operating Expenses are anticipated to decrease by $2.6 million (1.5%) from the FY 1986/87 budget to $171.8 million for the year.

Net labor cost is expected to increase $1.5 million (1.3%). Labor cost is based primarily on contractual wage and salary increases, plus the increased cost of providing existing fringe benefits.

Total nonlabor cost is expected to decrease by $4.1 million (6.8%). The cost of the Express Bus and Shuttle Program is expected to increase by $0.3 million. New initiatives to make this program more financially effective are under study, but are not expected during FY 1987/88. Transfer payments to AC Transit are expected to cost $5.8 million. In accordance with the regional transit financial planning agreement among BART, the two other major transit operators and MTC, transfer payments will also be made to S. F. MUNI for $1.3 million.

Traction/Station Power cost is expected to be $4.0 million lower than the cost budgeted for FY 1986/87. Other nonlabor expense is expected to decrease by $0.4 million. Expected receipts of financial assistance through MTC of $1.9 million SB 1335 (STA) and $0.3 million TDA funds are budgeted.

As called for in last year's Five Year Plan, certain capital expenditures are also to be funded from operating sources. Capital Allocations totalling $4.7 million are budgeted for Improvement Allowance ($3.1 million) and Planning and Station Area Development ($1.6 million). The Operating Budget will also fund Debt Service Allocations of $12.6 million for the Revenue Bond Debt Service.

Figure 43
1987 FIVE-YEAR OPERATING BUDGET PROJECTIONS
($1,000s)

	Actual 1985/86	Budget 1986/87	Actual 1986/87	Projected 1987/88	Projected 1988/89	Projected 1989/90	Projected 1990/91	Projected 1991/92
REVENUES								
Net Rail Revenue	$72,134	$83,110	$76,915	$78,295	$82,499	$85,158	$88,196	$91,396
Express Bus Revenue	918	1,099	739	860	911	963	972	982
Net Passenger Revenue	$73,052	$84,210	$77,654	$79,155	$83,410	$86,121	$89,168	$92,378
Interest Earnings	$4,997	$6,240	$4,848	$4,378	$2,922	$2,259	$1,696	$1,442
Other Revenue	4,022	1,591	2,122	2,117	2,225	2,588	3,175	3,450
Other Operating Revenue	$9,019	$7,831	$6,970	$6,495	$5,147	$4,847	$4,871	$4,892
Net Operating Revenues	$82,071	$92,040	$84,624	$85,650	$88,557	$90,968	$94,040	$97,270
EXPENSES								
Net Labor	$106,442	$113,860	$110,929	$115,334	$127,023	$135,340	$143,244	$151,246
Electric Power	19,272	22,100	17,075	18,100	20,076	21,946	23,696	25,615
Other Non-Labor	21,915	23,088	18,890	22,683	24,097	25,478	27,351	29,332
Express Bus	7,579	8,099	8,068	8,354	8,772	9,210	9,671	10,154
BART Shuttles	185	226	157	256	269	282	296	311
Bus Operator Transfer Payments	5,500	7,083	7,083	7,083	7,083	7,083	7,083	7,083
Total Operating Expenses	$160,894	$174,457	$162,201	$171,810	$187,320	$199,340	$211,341	$223,742
OPERATING DEFICIT	($78,823)	($82,416)	($77,577)	($86,160)	($98,763)	($108,372)	($117,302)	($126,472)
FINANCIAL ASSISTANCE								
Property Tax Revenues	$6,757	$6,750	$7,412	$7,639	$8,021	$8,422	$8,843	$9,285
Sales Tax Revenues (BART 75% Share)	84,232	88,856	87,091	89,091	93,545	98,222	103,134	108,290
TDA ('BART Only')	564	548	548	348	366	384	403	423
STA, Other State Funds	1,826	2,399	479	1,911	0	0	0	0
Debt Service Allocations	(11,566)	(13,800)	(13,474)	(12,568)	(14,460)	(14,550)	(14,580)	(14,645)
Capital and Other Allocations	(3,000)	(4,505)	(4,505)	(4,708)	(4,888)	(5,072)	(5,261)	(5,454)
Total Financial Assistance	$78,812	$80,247	$77,551	$81,713	$82,584	$87,406	$92,539	$97,900
NET FINANCIAL RESULT	(11)	(2,169)	(27)	(4,447)	(16,179)	(20,966)	(24,763)	($28,573)
NET OPERATING RESERVE								
Beginning Balance	$5,344	$5,333	$5,333	5,306	$859	($15,320)	($36,286)	($61,049)
Ending Balance	$5,333	$3,164	$5,306	$859	($15,320)	($36,286)	($61,049)	($89,622)
FINANCIAL INDICATORS								
Annual Patronage	58,895	60,423	56,241	58,369	60,773	62,731	64,969	67,327
Annual Passenger Miles	751,848	774,617	695,944	733,600	762,701	787,274	815,361	844,954
Fare Box Ratio: Rail Only	48.9%	52.3%	52.4%	50.2%	48.2%	46.6%	45.4%	44.3%
Fare Box Ratio: Express Bus Service	12.1%	13.6%	9.2%	10.3%	10.4%	10.5%	10.1%	9.7%
Operating Ratio	51.0%	52.8%	52.2%	49.9%	47.3%	45.6%	44.5%	43.5%
Rail Cost Per Passenger Mile	$0.196	$0.205	$0.211	$0.213	$0.224	$0.232	$0.238	$0.244
CAPITAL AND DEBT SERVICE ALLOCATIONS								
Revenue Bond Debt Service	$10,387	$12,600	$12,586	$12,568	$14,460	$14,550	$14,580	$14,645
Sales Tax Anticipation Note Debt Service	1,180	1,200	888	0	0	0	0	0
Improvement Allowance	3,000	3,100	3,100	3,100	3,200	3,300	3,400	3,500
Planning	0	668	1,405	670	703	738	775	814
Joint Development	0	737	0	938	985	1,034	1,086	1,140
Total Capital and Debt Service Allocations	($14,566)	($18,305)	($17,979)	($17,276)	($19,348)	($19,622)	($19,841)	($20,099)

After these allocations have been budgeted, total operating uses exceed sources by $4.4 million.

ANTICIPATED GROWTH RATES

This section describes the assumptions on which the updated five-year financial plan is based.

Labor is the most significant element of operating costs at 67.2% with all non-labor costs comprising only 32.8% over the next five-year period. The operating budget plan in Figure 43 includes two components of labor expense, the current base and that which is required for expanded service. The base includes those positions which are needed to maintain current service. Over the five-year period, some new positions will have to be added for this purpose. However, most of the increase in the base reflects the cost of anticipated improvements in wages and benefits as covered by new contracts which are to be negotiated during this five-year cycle. Maintaining current employee benefits over the five-year period and providing the additional positions needed to continue existing service are also included.

Non-labor expense includes two major items, electric power and purchased transportation (express bus, shuttle and feeder service), and a variety of other lesser items.

The forecasting of future power cost increases is subject to a considerable degree of uncertainty given the large number of influencing factors. These include decisions made at the State and Federal levels concerning atomic power plant certification and international political developments which affect the price and/or availability of oil. Another significant factor is the magnitude of the Sierra snowpack and thus available hydroelectric resources. The power cost associated with providing the current level of service is expected to increase 6% the first year, and 4.5% annually thereafter. Snowpack and fuel price levels together with the availability of electric power from alternate sources will impact future BART power cost estimates. Alternate sources of power are being evaluated and future cost projections may be affected.

It is anticipated that the Express Bus program may be operated by a private firm during the coming five-year period to improve financial effectiveness. At this point, it is not clear what the financial impact will be of such privately provided service.

All other nonlabor expense items are expected to increase by an average of 5.0% annually to maintain current service; actual increases are greater due to the additional service planned.

BART passenger growth was documented above in Figure 13 (see Chapter I). Other operating revenue is expected to be somewhat lower than previously budgeted because of declining interest rates on investment of operating funds and the impact of the new tax laws on tax anticipation notes.

For the upcoming five-year period, BART sources of financial assistance are forecast to grow at somewhat lower rates than last year's plan assumed because of slower than expected economic growth. Sales tax yields are projected to expand by 3.1% in FY 1987/88 and 5% each year thereafter, based in part on the projected statewide growth forecast by the Commission on State Finance, as adjusted for historically lower growth in the three BART counties. Property tax revenues are expected to increase by 3% in FY 1987/88 and 5% each year thereafter.

Discretionary financial assistance which is allocated to BART by MTC is likewise projected at significantly different levels in this year's Five Year Plan, based on the preliminary allocation estimate furnished earlier this year. This estimate calls for only $1.9 million of STA funds and $0.3 million of TDA funds. For purposes of the current financial plan, TDA funds are expected to grow at the rate indicated above for BART sales tax revenues. Because of continued uncertainty about the continuation of the STA program beyond the one-year extension now being considered by the Legislature, no additional funds are projected from this source beyond FY 1987/88.

ADDITIONAL STAFFING REQUIREMENTS

In preparation for the planned increases in service capacity, BART will need to begin expanding its current staffing level to support this change. Most of the increase will occur in the operations departments as the District takes delivery of new revenue vehicles, expands to provide appropriate maintenance, and ultimately puts more cars and trains on line. A few additional positions will be required in administrative and support departments, due to the increased workload produced by increased cash handling volume and new marketing programs.

Figure 44 summarizes new hiring requirements for the five-year period as projected by appropriate departments. The largest increases are in Field Services, Power & Way Maintenance, Finance, and Rolling Stock Maintenance. As expected, staffing increases in these departments will be required in anticipation of receipt of the new revenue vehicles and with sufficient lead time for training prior to inauguration of expanded peak period train service.

FIVE-YEAR OPERATING BUDGET PLAN

The five-year operating budget plan is summarized in Figure 43. Actual results for FY 1985/86 and estimated results for FY 1986/87 are also shown. Note that financial performance in FY 1986/87 is significantly below budget in operating revenue and financial assistance as well as operating expense. According to the projections in Figure 43, annual deficits ranging frm $4-28 million are anticipated at current fare levels.

Although the anticipated FY 1986/87 financial result is a manageable deficit, the large projected operating deficits for the period FY 1987/88 through FY 1991/92 are cause for concern. In view of the slower than previously estimated growth of operating revenues and financial assistance, a comprehensive strategy for maintaining BART's finacial viability must be developed in conjunction with the Financial Plan study to be conducted in the Fall of 1987 by the Metropolitan Transportation Commisssion.

PROJECTED REQUIREMENTS FOR ADDITIONAL STAFF POSITIONS*
FY 1986/87 - FY 1991/92

Department	Budget 86/87	Incremental Positions as of June 30 87/88	88/89	89/90	90/91	91/92	5-Year Increase	Total 91/92
GENERAL MANAGER	5.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0
LEGAL	18.0	0.0	2.0	0.0	0.0	0.0	2.0	20.0
FINANCE	116.0	(6.0)	11.0	1.0	1.0	1.0	8.0	124.0
DISTRICT SECRETARY	4.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0
PLANNING, BUDGET AND RESEARCH	29.0	1.0	0.0	0.0	0.0	0.0	1.0	30.0
PUBLIC AFFAIRS	12.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0
SAFETY	14.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0
EMPLOYEE RELATIONS	58.0	(10.0)	0.0	0.0	0.0	0.0	(10.0)	48.0
AFFIRMATIVE ACTION	8.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
MATL MGMT & PROCUREMENT	67.0	7.0	0.0	0.0	0.0	0.0	7.0	74.0
INFORMATION SYSTEMS	36.0	(1.0)	0.0	0.0	0.0	0.0	(1.0)	35.0
ADMINISTRATIVE SERVICES	32.0	0.0	0.0	0.0	0.0	0.0	0.0	32.0
Total Admin. and Support Services	399.0	(9.0)	13.0	1.0	1.0	1.0	7.0	406.0
MAINTENANCE & ENGINEERING			0.0	0.0	0.0	0.0	0.0	0.0
MAINTENANCE SUPPORT	118.0	(1.0)	2.0	0.0	0.0	0.0	1.0	119.0
COMMUNIC/COMPONENT REPAIR	160.0	(3.0)	0.0	0.0	1.0	2.0	0.0	160.0
ROLLING STOCK MAINTENANCE	316.0	(3.0)	47.0	0.0	0.0	0.0	44.0	360.0
POWER & WAY MAINTENANCE	452.0	13.0	17.0	12.0	10.0	0.0	52.0	504.0
ENGINEERING & CONSTRUCTION	53.0	(1.0)	0.0	0.0	0.0	0.0	(1.0)	52.0
Total Maintenance and Engineering	1,099.0	5.0	66.0	12.0	11.0	2.0	96.0	1,195.0
FIELD SERVICES	24.0	3.0	0.0	0.0	0.0	0.0	3.0	27.0
TRAIN OPERATIONS	311.0	8.0	4.0	3.0	6.0	0.0	21.0	332.0
STATION OPERATIONS	210.5	0.0	3.0	8.0	0.0	3.0	14.0	224.5
POLICE SERVICES	183.0	(8.0)	3.0	5.0	2.0	5.0	7.0	190.0
Total Field Services	728.5	3.0	10.0	16.0	8.0	8.0	45.0	773.5
Total Operations Departments	1,827.5	8.0	76.0	28.0	19.0	10.0	141.0	1,968.5
Total District	2,226.5	(1.0)	89.0	29.0	20.0	11.0	148.0	2,374.5
Cumulative Increase/(Decrease)	--	(1.0)	88.0	117.0	137.0	148.0		

---

*Includes part-time Emergency Procedures Assistants, Train Operators, Station Agents, and Police Cadets at one-half position each.

In order for BART to balance its five-year operating budget and minimize the necessity for fare increases, some combination of the following strategies will be necessary:

(1) **INCREASE PATRONAGE: Stimulate additional demand through more effective marketing, reduced load factors, improved station access, and other service enhancements.**

Attempts to attract additional riders, especially during peak periods, must be intensified. Recent experience of both BART and other transit operations indicates that ridership has leveled off and new growth will be harder to attain. For this reason, maintenance and improvement of service quality are critical to any attempt to increase patronage.

In reviewing the draft plan and objectives proposed for FY 1987/88, the Board of Directors called for a seated load factor policy wherever peak trains can be lengthened as C-cars are put into service. This new policy should improve service, but it may also increase the operating deficit if additional farebox revenues don't offset the extra expense. Planned station access improvements should mitigate both real constraints to system utilization as well as negative market perceptions.

(2) **OTHER REVENUES: Development of other revenues from fiber optics, telephones, etc.**

Such other revenue sources should be pursued aggresively. The potential in this area may be limited, thus this strategy must be combined with other efforts to balance the budget.

(3) **REDUCE OPERATING EXPENSES: Reduction of operating expenses through greater improved cost effectiveness in areas such as power costs and express bus, and reductions in support programs.**

Since the draft financial plan was presented, efforts have focused on reducing expenditures and, thereby, projected operating deficits. The FY 1987/88 budget proposed for adoption reflects a savings of $1.2 million for traction power and $260,000 for express bus and shuttle service from tentative budget levels. These reductions are essential, but are not enough to improve significantly the financial outlook for BART service during the planning period.

Further expenditure reductions should be identified and fully evaluated if the outlook for operating revenues and financial assistance does not improve. Such a program of deeper expenditure cuts must be designed carefully so as to mimimize impacts on service quality.

PROJECTED REQUIREMENTS FOR ADDITIONAL STAFF POSITIONS*
FY 1986/87 - FY 1991/92

Department	Budget 86/87	Incremental Positions as of June 30 87/88	88/89	89/90	90/91	91/92	5-Year Increase	Total 91/92
GENERAL MANAGER	5.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0
LEGAL	18.0	0.0	2.0	0.0	0.0	0.0	2.0	20.0
FINANCE	116.0	(6.0)	11.0	1.0	1.0	1.0	8.0	124.0
DISTRICT SECRETARY	4.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0
PLANNING, BUDGET AND RESEARCH	29.0	1.0	0.0	0.0	0.0	0.0	1.0	30.0
PUBLIC AFFAIRS	12.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0
SAFETY	14.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0
EMPLOYEE RELATIONS	58.0	(10.0)	0.0	0.0	0.0	0.0	(10.0)	48.0
AFFIRMATIVE ACTION	8.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0
MATL MGMT & PROCUREMENT	67.0	7.0	0.0	0.0	0.0	0.0	7.0	74.0
INFORMATION SYSTEMS	36.0	(1.0)	0.0	0.0	0.0	0.0	(1.0)	35.0
ADMINISTRATIVE SERVICES	32.0	0.0	0.0	0.0	0.0	0.0	0.0	32.0
Total Admin. and Support Services	399.0	(9.0)	13.0	1.0	1.0	1.0	7.0	406.0
MAINTENANCE & ENGINEERING			0.0	0.0	0.0	0.0	0.0	0.0
MAINTENANCE SUPPORT	118.0	(1.0)	2.0	0.0	0.0	0.0	1.0	119.0
COMMUNIC/COMPONENT REPAIR	160.0	(3.0)	0.0	0.0	1.0	2.0	0.0	160.0
ROLLING STOCK MAINTENANCE	316.0	(3.0)	47.0	0.0	0.0	0.0	44.0	360.0
POWER & WAY MAINTENANCE	452.0	13.0	17.0	12.0	10.0	0.0	52.0	504.0
ENGINEERING & CONSTRUCTION	53.0	(1.0)	0.0	0.0	0.0	0.0	(1.0)	52.0
Total Maintenance and Engineering	1,099.0	5.0	66.0	12.0	11.0	2.0	96.0	1,195.0
FIELD SERVICES	24.0	3.0	0.0	0.0	0.0	0.0	3.0	27.0
TRAIN OPERATIONS	311.0	8.0	4.0	3.0	6.0	0.0	21.0	332.0
STATION OPERATIONS	210.5	0.0	3.0	8.0	0.0	3.0	14.0	224.5
POLICE SERVICES	183.0	(8.0)	3.0	5.0	2.0	5.0	7.0	190.0
Total Field Services	728.5	3.0	10.0	16.0	8.0	8.0	45.0	773.5
Total Operations Departments	1,827.5	8.0	76.0	28.0	19.0	10.0	141.0	1,968.5
Total District	2,226.5	(1.0)	89.0	29.0	20.0	11.0	148.0	2,374.5
Cumulative Increase/(Decrease)	--	(1.0)	88.0	117.0	137.0	148.0		

---

*Includes part-time Emergency Procedures Assistants, Train Operators, Station Agents, and Police Cadets at one-half position each. Does not include capitalized or otherwise reimbursable positions.

In order for BART to balance its five-year operating budget and minimize the necessity for fare increases, some combination of the following strategies will be necessary:

(1) **INCREASE PATRONAGE: Stimulate additional demand through more effective marketing, reduced load factors, improved station access, and other service enhancements.**

Attempts to attract additional riders, especially during peak periods, must be intensified. Recent experience of both BART and other transit operations indicates that ridership has leveled off and new growth will be harder to attain. For this reason, maintenance and improvement of service quality are critical to any attempt to increase patronage.

In reviewing the draft plan and objectives proposed for FY 1987/88, the Board of Directors called for a seated load factor policy wherever peak trains can be lengthened as C-cars are put into service. This new policy should improve service, but it may also increase the operating deficit if additional farebox revenues don't offset the extra expense. Planned station access improvements should mitigate both real constraints to system utilization as well as negative market perceptions.

(2) **OTHER REVENUES: Development of other revenues from fiber optics, telephones, etc.**

Such other revenue sources should be pursued aggresively. The potential in this area may be limited, thus this strategy must be combined with other efforts to balance the budget.

(3) **REDUCE OPERATING EXPENSES: Reduction of operating expenses through greater improved cost effectiveness in areas such as power costs and express bus, and reductions in support programs.**

Since the draft financial plan was presented, efforts have focused on reducing expenditures and, thereby, projected operating deficits. The FY 1987/88 budget proposed for adoption reflects a savings of $1.2 million for traction power and $260,000 for express bus and shuttle service from tentative budget levels. These reductions are essential, but are not enough to improve significantly the financial outlook for BART service during the planning period.

Further expenditure reductions should be identified and fully evaluated if the outlook for operating revenues and financial assistance does not improve. Such a program of deeper expenditure cuts must be designed carefully so as to mimimize impacts on service quality.

(4) **DEFERRAL OF PLANNED SERVICE EXPANSION.**

The whole thrust of recent BART planning and capital improvements has been toward greater capacity and expanded service. The long-run market still appears strong. This option will have to be weighed carefully.

(5) **INCREASE SHARE OF MTC ALLOCATION: Allocation to BART of some portion of the 25% of the 1/2¢ sales tax revenues administered by MTC if additional local revenues become available to AC Transit and S. F. Muni.**

The Metropolitan Transportation Commission plans to prepare a Five Year Financial Management Plan to address the collective requirements of BART, AC Transit, and S.F. Muni. The plan is expected to be complete prior to the allocation decisions for FY 1988/89.

(6) **REDUCE TRANSFER PAYMENT:** (Or, in conjunction with point 5) **Reduction or elimination of the transfer payment requirement if additional local operating support becomes available for AC Tansit and S.F. Muni.**

If the above strategies (points 1 through 4) taken together are insufficient, then points 5 and/or 6 must be evaluated carefully. Since BART's farebox ratio is consistently higher than that of the bus operators, BART's riders in effect subsidize bus operation. The extent and degree of this subsidy should be reviewed thoroughly.

(7) **SERVICE CONSOLIDATION: Better coordination of regional service so as to improve its overall cost effectiveness.**

Collectively, the three major operators may provide more service than is necessary or the region can afford. Regional service levels need to be reviewed thoroughly and better tailored to both need and funding availability.

(8) **REDUCE CAPITAL ALLOCATIONS: Reduction of the amount allocated from BART operating funds for capital purposes.**

This strategy has been invoked since FY 1985/86, and may need to be continued and broadened. Funding of the joint development program from capital sources may need to be considered.

In this presentation, an estimated year-end result is shown for each year, which represents the District's ending balance in its net operating reserve, or working capital. District financial operations require a working capital balance of $5 million. The revenue bond covenant requires that a reserve be maintained equivalent to 2% of the following year operating budget. As noted, this will be funded from capital reserves as necessary.

The plan assumes that the revenue bond debt service requirements will be funded each year by an allocation from the operating budget. This and other debt service requirements are summarized in Figure 45.

Figure 45

FIVE-YEAR PLAN DEBT SERVICE SUMMARY*
($1,000's)

	FY 86/87#	FY 87/88	FY 88/89	FY 89/90	FY 90/91	FY 91/92
Debt Service Expense						
General Obligation Bond Interest Redemption	54,218	54,737	55,311	55,443	47,189	46,000
SSD #1 Bond Interest and Redemption	735	736	736	735	733	725
Revenue Bond Debt Service	12,568	12,568	14,460	14,550	14,580	14,645
Sales Tax Anticipation Note Debt Service	889	0	0	0	0	
Total Debt Service Requirements	$68,410	$68,041	$70,507	$70,728	$62,502	$61,370
Sources of Funds						
General Obligation Bond Interest and Redemption Fund	54,218	54,737	55,311	55,443	47,189	46,000
SSD #1 Bond Interest and Redemption Fund	735	736	736	735	733	725
Allocation from Operating Budget for Revenue Bond Debt Service	12,568	12,568	14,460	14,550	14,580	14,645
Allocation from Operating Budget for Sales Tax Anticipation Note Debt Service	889	0	0	0	0	
Total Sources of Funds	$68,410	$68,041	$70,507	$70,728	$62,502	$61,370

Actual/estimated

ATTACHMENT

PUBLIC COMMENT

COMMENTS IN LETTER FROM CHARLES DAVIS, CHIEF, PUBLIC TRANSPORTATION BRANCH, CALTRANS

POINT 1: We suggest that BART consider including enhancements of average speed as a goal and that an attempt be made to determine if:

a) increases in average speed would generate additional patronage by making the system more time-competitive with other forms of transportation;

b) it is possible to obtain more efficient staff utilization at improved overall average speeds;

c) it is technically feasible to improve overall average speed.

RESPONSE: BART recognizes the desirability of reducing line-haul travel time by increasing operating speeds wherever possible. Some enhancements are planned as part of the wayside reconfiguration and resignaling project scheduled for mid-1989. It is anticipated that fewer trains and cars will be needed after implementation of the planned changes, with attendant savings in train operators and mileage-based expense. Some improvement in overall speed is expected from these changes. Beyond some point, further speed enhancements may not be cost-effective. Instead, BART will continue to focus on improving service dependability. For riders transferring to and from buses, average speed can be increased by improved bus/rail schedule coordination.

POINT 2: The budget reduction strategies listed on page 89 of Volume I are of critical importance but seem vague. What is meant by "reductions in support programs" (item 3)? Strategies 1 and 4 seem to be in opposition to each other. We suggest you also consider including imposition of parking fees on this list.

RESPONSE: Past budget reduction efforts were made only for non-service related functions and involved minimal impacts on service quality experienced by BART riders. This criterion would guide future reductions in support programs or any other expense factor to the extent possible. We agree that efforts to attract riders by improved service may be thwarted by deferral of capacity expansion. Given the recent lack of growth in BART ridership, further increases in user charges may be counterproductive. Parking fees are not currently considered to be an acceptable policy option.

POINT 3: We suggest that for planning purposes BART should be defined as a multimodal, regional trunk transportation provider rather than as a rail system using highly specific technology. Some benefits which might result from this new definition are listed below:

a) It might aid in the planning of transit provision for the growing number of suburban-to-suburban work trips. For instance, it might enable exploration of whether express bus service could be provided between BART park and ride lots in Contra Costa County and Bishops Ranch/Hacienda Business Park.

b) It might encourage greater flexibility in planning new service provision. For instance, a multimodal planning approach might result in implementation of bus extensions which then could be converted to fixed guideways once utilization becomes high enough to warrant conversion. Although BART utilizes express buses serving park and ride lots, extension planning does not appear to be based on feedback from these operations. Implementation of new service, such as to SFO might be tested with bus shuttle operation integrated into BART timetables, prior to rail extension.

c) It might encourage better integration of existing express bus service into the BART system.

RESPONSE: For planning purposes, BART could be characterized as a "multi-modal, regional trunk transportation provider" rather than a rail system. Operation of express bus service in corridors not served by rail supports this designation. This type of service provides considerable flexibility. In conjunction with staff from eastern and central Contra Costa County Transit Authorities, BART is currently exploring the possibilities for service between East County park/ride lots and I-680/I-580 corridors employment centers. It is, however, premature to report the preliminary discussions in this year's Five Year Plan.

The contention that extension planning does not incorporate experience with express bus service is invalid. Extension planning studies explicitly involve the consideration of current and potential bus service in these corridors.

POINT 4: The "comprehensive marketing program" mentioned on page 20 (Volume I) appears to be an advertising and outreach program. We suggest consideration of a more extensive marketing approach which would segment the transportation market and explore better ways of reaching new groups of users and increasing the market share among existing groups of users. Information from the marketing component ideally should be fed into capital and operation decisions.

RESPONSE: The need for "comprehensive marketing" of transit service is almost universally supported in the industry, but effective means of implementing such programs are still being tested and developed. We agree that marketing should be more than "an advertising and outreach program." Bay Area residents have a very high degree of awareness of BART; the challenge facing the District is to convince would-be and former riders that service quality has improved, and to maintain current high dependability standards as capacity is expanded.

POINT 5: We suggest that BART consider establishing a continuing program to collect and evaluate data on new technology that could be applied to the BART system.

RESPONSE: New technology should be carefully monitored (through a structured "futures" program) and implemented if it is demonstrated to be cost-effective, provided sufficient funding is available. It may prove even more cost-effective, however, to learn to use existing technology more reliably.

POINT 6: Has the effect of new rail extensions on BART fares been quantified? Before implementing extensions, their effect on the financial health of the existing system and their effects on current riders should be evaluated. This comment also applies to the MUNI Metro extension which will be funded partially by BART.

RESPONSE: The budget and service impacts of proposed rail extensions have been evaluated and will continue to be studied further (as is being done in the in-progress Alternatives Analysis for the Pittsburg-Antioch Corridor Study, the Fremont-South Bay Corridor Study, the Livermore-Amador Valley Rail Alternatives Study, and the Colma BART Station Study).

POINT 7: Volume I, page 57: Has the financial cost of providing parking (including opportunity cost) been quantified and explicitly compared to the cost of bus subsidy, and have the relative ridership gains been compared?

RESPONSE: The trade-offs between parking and subsidy of bus feeder service have been studied in considerable detail. BART's experience is that parking is perceived by riders as preferable to feeder bus service, particularly in suburban communities. BART does, never the less, continue to provide MUNI and AC Transit in the range of $7.1 million each year in subsidy for feeder bus service, in addition to the $8.6 million annual cost of BART's express bus service.

POINT 8: Volume I, page 5 and other locations: Reference is made to the "joint BART/MUNI pass". This should probably read "MUNI Fast Pass", as it does in Volume II, page 4.

RESPONSE: This fare instrument should be referred to throughout the plan as the BART/MUNI Fast Pass.

POINT 9: Volume I, page 16: The second note at the bottom of the page is unclear. Is aggregate fare elasticity a weighted average of peak and off-peak elasticity, or is it something altogether different? Does the peak period elasticity experienced in the implementation of the fare increase, combined with the slow patronage recovery following that increase, indicate a need to reevaluate assumptions which relate peak ridership largely to capacity increases?

RESPONSE: The aggregate fare elasticity reported is the average of changes in peak and off-peak ridership; these changes were influenced by a number of factors including the increase in fares. The higher than expected peak period elasticity probably resulted from the fact that the significant fare increase followed an extended period during which service quality was lower than normal. This situation was caused by implementation of two capacity expansion projects.

POINT 10: Volume I, pages 66-67: Patron's perceptions while on the trains also includes their perception of the speed of the train, and this affects their perception of BART's competitiveness with other modes. Both absolute speed and relative speed (i.e., relative to freeway traffic where BART is in the median) are perceived.

RESPONSE: Perceptions of the relative speed of one mode vis-a-vis that of another no doubt affect mode choice.

COMMENTS IN LETTER FROM CHARLES N. COLLINS, MAYOR
CITY OF HERCULES

POINT 1: We have received and reviewed the draft copy of your 1987 5-Year Plan. That document mentions very little about the West Contra Costa County BART extension. It does, however, allocate $1.4 million dollars for expenditure on a 500-car Park & Ride in Hercules in 1987/88 and $71,000 for that same facility in 1988/89.

The Hercules City Council strongly protests the additional allocations of money for improvements to a site which we adamantly oppose for use as a transit-related facility. As you know, there has not been any real alternatives analysis for the use of this site as a transit facility. We request that BART remove the expenditure for both the above-mentioned fiscal years from your 5-Year Plan and allocate it to some other project.

RESPONSE: We respectfully disagree with your contention. The BART West Contra Costa Extension Study (June 1983) along with subsequent park/ride analysis indicate this site to be the best location for a transit facility in Hercules. However, the decision to build such a facility is still pending. Until the decision is reached, it is appropriate that funds are set aside for this purpose. The proposed BART West Contra Costa Extension Station Alternatives Study will also evaluate potential locations for stations along the entire West Contra Costa corridor.

COMMENTS IN LETTER FROM MAJORIE MACRIS, PLANNING ADMINISTRATOR
CITY OF BERKELEY

POINT 1: Service Proposals: Although there is excess capacity on trains to Berkeley, the constraint for riders to our City is mainly on the Concord line. Many of our trips originate in Contra Costa County, therefore we do encourage increasing the number of trains especially on that line. We also are glad to read that headways will be increased (sic) as well, funding permitting.

POINT 2: Safety Factors: Since the system will never reach the point where all passengers are seated, better design of the train is necessary to enable riders to hold onto posts or overhead handles. In addition, space should be made available to persons in wheelchairs. Not having space for the disabled creates a safety problem for them as well as the other passengers, especially during the commute periods.

RESPONSE: Overhead handrails for standing riders were added to all BART vehicles as part of the fire-hardening program completed in August 1986 (in addition to handgrips on seat ends in the original design). Space for persons in wheelchairs has been allocated near doorways in the new C-cars as decided by the Board of Directors.

POINT 3: Fares: We are glad to see that the AC/BART plus ticket has become a reality. It definitely provides for an opportunity for increased ridership. We are, however, concerned about the $.80 minimum fare, which deters local short trips. Consideration should be given to possibly lowering the fares in some locations to attract more local trips. The same consideration should be given to off-peak trips.

RESPONSE: Unfortunately, fare reductions mean revenue reductions. In view of the significant deficits facing BART, MUNI and AC Transit, fare reductions aren't affordable without offsetting increases in financial assistance. For this reason, MTC has directed AC and MUNI to match BART's $0.80 fare or risk losing financial assistance. Analysis of the 1986 fare increase shows that peak elasticity exceeded off-peak elasticity, thus off-peak riders are not likely to increase riding significantly in response to a fare decrease.

POINT 4: Parking Projects: The 1986 Five Year Plan indicated an addition of 100 parking spaces at the Ashby Station; this is not shown in this Plan. We are curious as to why. The proposal for additional spaces at the North Berkeley Station has been approved by the Transportation Commission; however, there was real concerns that the spaces built are done in phases so that the parking does not attract commuters from outside the area thereby impacting local streets.

RESPONSE: BART intends to add up to 100 parking spaces through redesign of the existing lots at Ashby Station during the period 1988/89 - 91/92. The omission of this project from Figure 32 of the draft document was an oversight which will be corrected in the final document.

Regarding planned parking expansion at North Berkeley Station, BART market research shows clearly that patrons using this station are overwhelmingly Berkeley residents. We see no reason for this pattern to change with the increase in parking availability, particularly since parking has been increased significantly at El Cerrito del Norte Station, and will soon be increased at El Cerrito Plaza Station. In any event, the planning of the North Berkeley parking projects has been conducted in very close communication with neighborhood residents, who strongly endorse our plans.

POINT 5: Funding: More emphasis should be placed on alternative strategies to address the anticipated deficit. Part of that strategy could include charging parking fees at BART Stations to both increase funds and create equity between patrons driving versus using the bus to get to the Station. The proposed strategy to allocate to BART a portion of the 25% of the 1/2% sales tax is unsatisfactory, since it takes away from AC and MUNI which have their own deficit problems.

RESPONSE: Given the recent lack of growth in BART ridership, further increases in user charges may be counterproductive. Parking charges are currently not considered to be a viable policy option. While it is true that reallocation of the 25% of the 1/2% sales tax would worsen deficits faced by the other operators, this underscores the need faced by all three agencies for additional financial assistance.

COMMENTS IN LETTER FROM AYN WEISKAMP, CHAIR LIVERMORE/AMADOR VALLEY TRANSIT AUTHORITY

POINT 1: We would like to know how BART plans to provide operating subsidies for the Dublin Canyon Extension, since the existing system faces a cumulative operating deficit of $97,298,000 by FY 1991-92. Would BART be considering another tax increase to generate additional revenues, or what other sources of revenues are being considered by BART for these operating subsidies?

RESPONSE: BART is not considering a tax increase to provide operating subsidies for the Dublin Canyon Rail Extension Project. The necessary operating support is expected to be provided in part from reduced express bus costs and the general growth in the current sales tax. As operating support requirements are further defined, BART will seek funding from current sources allocated by the Metropolitan Transportation Commission, including sales tax funds and federal operating assistance.

POINT 2: The statements in the Draft 1987 BART Five-Year Plan and the Initial Project Report for the Dublin Canyon Rail Extension are inconsistent.

RESPONSE: These statements are not inconsistent. BART will be the operator of the Dublin Rail Corridor Project if BART is selected as the preferred mode or if light rail is selected and BART is designated as the project sponsor.

John Carrol Naish, BART Associate General Legal Counsel, has advised Ms. Weiskamp by letter of July 8, 1987, that he has not reached any determination on whether or not the Alameda County Transportation Authority should make any interpretation regarding the definition of "project sponsor."

POINT 3: We would like to know the source of capital funding for the Dublin Canyon Rail Extension beyond the $170 million plus the $14.935 million for the Dublin Park and Ride Lot, if the BART rapid rail is selected. The cost for the BART rapid rail for the Dublin Canyon Rail Extension is currently estimated at $220 million. An additional $35 million would be required.

RESPONSE: The proposed BART funding plan for extensions has been revised. This plan now calls for programming $70 million in BART reserve funds for extensions. No allocation of these funds has been made. However, it is anticipated that some portion of these funds will be available for the Dublin Canyon Rail Extension.

COMMENTS IN LETTER FROM ALVIN D. JAMES, DIRECTOR OF CITY PLANNING CITY OF OAKLAND

(ON DRAFT 1986 PLAN, RECEIVED AFTER PUBLICATION)

POINT 1: In terms of plans and projections for system and service improvements through FY 1991, the City of Oakland continues to emphasize the unmet service needs of commuters who either work in Oakland, or travel through Oakland on work-home journeys. Specifically, we advocate the establishment of an exclusive peak-hour Concord/Oakland train and a direct (Express) bus service to connect the Concord line with stations in the City of Berkeley.

In the 1985 Five Year Plan, BART identifies the Concord/Daly City line as having one of the highest load factors, and possessing the greatest potential for increased patronage, related to growing development centers in Contra Costa County and the Oakland and San Francisco CBDs. The District proposes to address these issues by increasing the number of trains on the line, and by decreasing headways between trains. Nevertheless, BART projects that overloading will continue to be a problem on this line, at peak periods. The addition of another peak-period train from Concord to Oakland should alleviate this problem, and boost ridership through increased line capacity. Increased mass transit usage also underlies our ongoing advocacy for a Concord/Berkeley direct bus service, which BART can easily incorporate into its System Access Implementation Program.

In light of recent downward revisions in ridership, ridership projections, and financial assistance and revenues, and given that BART is now considering expansion of its feeder-bus service, this may be an appropriate time to reconsider these proposals. The District itself has repeatedly emphasied the importance of efficient and comprehensive system-access to encourage and increase ridership and fare-box revenues. Both proposals to extend BART service can only help to achieve these objectives.

RESPONSE: As you are aware, BART is currently in the midst of implementing its Capacity Expansion Program which will result in higher service levels systemwide. As a result of BART's configuration with respect to downtown Oakland, the City of Oakland stands to benefit most from this program. The recently completed KE Track is part of this effort and now provides added line capacity and operational flexibility through the central part of the BART system in downtown Oakland. With the KE Track, the provision of exclusive service between the Concord line, downtown Oakland, and the Fremont line becomes more feasible. The technical aspects of this kind of BART service, however, must be fully evaluated. This needs to include an assessment of the impacts of this new service on current and planned operations (i.e., allocation of available cars, train scheduling, midday train storage requirements, costs, etc). As part of the 1988 planning cycle, we will be investigating ways to improve BART's financial base and service beyond what is stated in the 1987 Five Year Plan, including the possibility of providing exclusive peak hour Concord/Oakland service.

Regarding the establishment of new BART express bus service between the Concord line and Berkeley stations, current District policy precludes BART from providing express bus service within travel corridors already served by rail. This policy issue notwithstanding, serious questions arise as to the feasibility of this new bus service with regard to:

- Bus travel times on already congested arterials versus the current rail schedule.
- Demand for such service above what is currently carried on the rail system (approximately 2100 weekday trips between the Concord and Richmond lines).
- Farebox return, which for the existing BART express bus system is approximately one-sixth that of rail (9% versus 52%).

POINT 2: We also wish to reiterate an interest in being involved in planning for parking and station area improvements within the City of Oakland. We have not been notified of any such activity to date.

RESPONSE: BART and City of Oakland staff cooperated on efforts to restripe BART parking lots with the City and BART is committed to continuing such cooperative efforts in the future.

COMMENTS IN LETTER FROM MICHAEL F. PICKERING, CITY TRAFFIC ENGINEER, CITY OF OAKLAND

(ON DRAFT 1986 PLAN, RECEIVED AFTER PUBLICATION)

POINT 1: We support BART's objectives in achieving high quality level of service. We see that quality and reliable service is vital to continue to maintain and attract ridership. We endorse the comments submitted by the City of Oakland's Planning Department and would like to add one more comment with respect to parking at the BART stations in Oakland.

According to Appendix D - Capital Project Justification, the four Oakland stations - Oakland West, Fruitvale, MacArthur and Lake Merritt - will have a projected shortage of 4,590 parking spaces in 1988. However, only 1,100 spaces are programmed to be added within the next five fiscal years from FY 86/87 to FY 90/91, according to Table II-7 on Page II-37A of the report. In particular, we are concerned about the projected shortage of 2,430 parking spaces in 1988 at the Oakland West Station. Only 775 future spaces are planned, thus only 32% of the demand will be met (Table II-7, BART PARKING PROGRAM).

The City has recently adopted a Residential Preferential Parking Program and it is likely that neighborhoods near BART stations will adopt the program. BART patrons who are currently parking in those neighborhoods will not be able to do so in the future, resulting in an even higher demand for parking spaces within BART parking areas.

We recommend that BART accelerate the parking program. Also, we request that BART consider providing more spaces and/or give reasons why more parking cannot be accommodated at the Oakland West station.

RESPONSE: The projected parking shortage estimates have recently been reduced, reflecting recent lack of patronage growth. The parking expansion program for Oakland has been increased. The current estimated parking shortage and planned parking increase for Oakland stations is: Oakland West 970/1,100; Fruitvale 650/560; MacArthur 470/640; Lake Merritt 285/400; and Rockridge 350/500.

POINT 2: Also, we want to reiterate our comment of last year that the City would like to become involved in the early stages of the planning and design of any changes to the parking areas at BART stations so that impacts to the nearby neighborhoods and streets can be evaluated.

RESPONSE: Such involvement is essential to effective implementation of parking improvement requirements.

(Continued from inside front cover)

BART FACTS
FISCAL YEAR 1986/1987 DATA
(JULY 1986 - JUNE 1987)

FARES

Regular Adult: Rail fares are largely based on a distance formula ranging from 80¢ to $3.00. The average weekday rail fare is currently $1.70. Regular express bus fares are 75¢ and $1.15 for one and two zone rides, respectively; rail patrons transferring to an express bus may obtain a free transfer worth 75¢.

Discounts: A maximum 6.25% rail fare discount is provided through the sale of $32 tickets for $30. Rail fares for handicapped persons, students 5-12 years of age, and persons 65 years of age and older are 10% of the regular adult fares. Children under 5 can ride free. Discount bus fares are 15¢ for one zone and 30¢ for two zones for the groups listed above. A $23 BART/MUNI monthly pass is also available, allowing for unlimited BART and San Francisco MUNI travel within San Francisco.

Transfers: Free transfers can be made between all BART trains. Special agreements between BART and most other Bay Area operators permit up to a 50% discount for connecting transit service (on a round-trip basis).

PATRONAGE

Average Weekday: BART patronage averaged 194,226 trips per weekday during FY 1986/87. Of these trips, 95,555 (48.9%) occurred within the 4-hour peak travel period (2 morning hours plus 2 afternoon hours). Transbay trips constitute 48.8% of weekday travel with 23.8% Eastbay and 27.4% Westbay.

Weekends: Saturday ridership averaged 81,411 trips with 46.6% Transbay, 27.7% Eastbay, and 25.7% Westbay. Ridership for Sunday averaged 48,366 with market shares of 46.6% Transbay, 29.5% Eastbay, and 23.9% Westbay.

Total Ridership: Rail ridership totaled 56,240,997 trips during FY 1986/87, 6.9% below a forecast of 60,422,200.

CAPACITY

On-Line Requirements: BART currently operates a maximum of 45 on-line trains which require 90 A-cars and 248 B-cars. In addition to these, 8 trains are held as ready spares requiring 16 A-cars and 24 B-cars.

Maximum Service Delivery: As of June 1987, scheduled peak hour capacity for the three Transbay routes serving downtown San Francisco and Oakland stations is 17 trains consisting of 159 cars (or 11,448 seats). For the Eastbay route, which also serves downtown Oakland stations, maximum peak hour capacity is 5 trains consisting of 24 cars (or 1,728 seats).

KEY PERFORMANCE INDICATORS

Train On-Time Performance: Daily on-time performance has consistently been above 90% since October 1980 and averaged 95.9% during FY 1986/87.

Scheduled Train Dispatches Completed: Performance has consistently been above 98% since January 1981 and averaged 99.2% during FY 1986/87.

Load Factors: Peak hour load factors during FY 1986/87 averaged 1.21 for Transbay service and 1.05 for the Eastbay route. Load factors for the shoulder period (approximately 45 minutes before and after the peak hour) averaged 1.09 Transbay and 0.96 for the Eastbay route. Maximum average load factors for offpeak service is 0.75 systemwide.

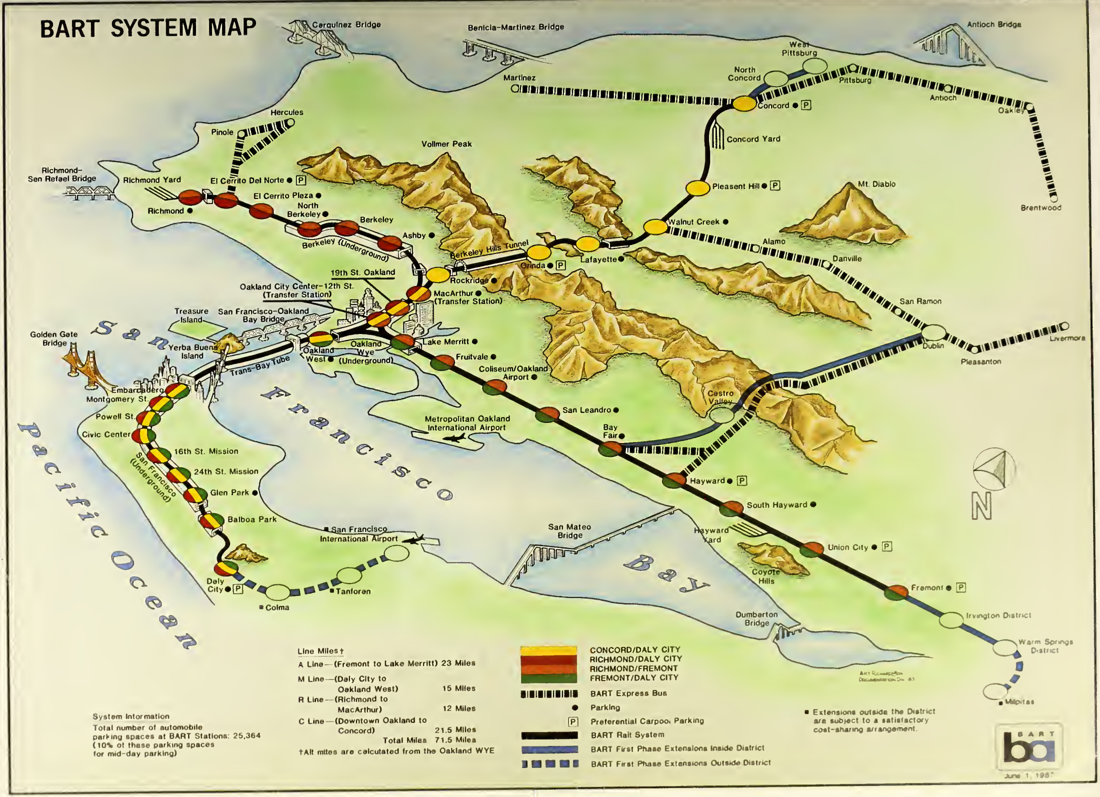
Peak Period Transbay Throughput: The percentage of scheduled Transbay capacity actually provided for FY 1986/87 is 97.9% for trains and 97.2% for cars.

OTHER PERFORMANCE DATA FOR FY 1986/87

PERFORMANCE DATA (1,000's)	
Total Passengers	56,241.0
Passenger-miles	695,944.3
Car-miles	30,266.6
Car-hours	1,110.9
Rail operating cost	$146,893.4
Express bus cost	$8,068.2
Transfer/Shuttle bus cost	$7,239.8
Total operating cost	$162,201.4
Net passenger revenue	$77,653.6
Other revenue	$6,970.3
Total revenue	$84,623.9
Operating deficit	$77,577.5

PERFORMANCE INDICATORS	
Farebox ratio	47.87%
Operating ratio	52.17%
Passenger-miles/seat-mile	31.94%
Rail operating cost/passenger-mile	21.11¢
Rail operating cost/passenger	$2.61
Total operating cost/passenger	$2.88
Total operating revenue/passenger	$1.50
Total operating deficit/passenger	$1.38
Rail operating cost/car-hour	$132.23
Rail operating cost/car-mile	$4.85
Passenger-miles/car-hour	626.47
Passenger trips/car-mile	1.86

BART SYSTEM MAP



Line Miles†

A Line—(Fremont to Lake Merritt) 23 Miles
M Line—(Daly City to Oakland West) 15 Miles
R Line—(Richmond to MacArthur) 12 Miles
C Line—(Downtown Oakland to Concord) 21.5 Miles
Total Miles 71.5 Miles

†All miles are calculated from the Oakland WYE

🟨 CONCORD/DALY CITY
🟥 RICHMOND/DALY CITY
🟥 RICHMOND/FREMONT
🟩 FREMONT/DALY CITY
▮▮▮▮ BART Express Bus
● Parking
P Preferential Carpool Parking
▬ BART Rail System
▬ BART First Phase Extensions Inside District
▬ ▬ ▬ BART First Phase Extensions Outside District

■ Extensions outside the District are subject to a satisfactory cost-sharing arrangement.

System Information
Total number of automobile parking spaces at BART Stations: 25,364
(10% of these parking spaces for mid-day parking)

B A R T

BAY AREA RAPID TRANSIT DISTRICT

DOCUMENTS DEPT.
OCT 27 1987
SAN FRANCISCO
PUBLIC LIBRARY

1987 FIVE-YEAR PLAN

EG
516
58
87-92
INAL
OL.2

Volume II

Capital Improvement Plan

AUGUST 1987

BART FACTS
FISCAL YEAR 1986/1987 DATA
(JULY 1986 - JUNE 1987)

FIXED FACILITIES

Mainline Track: Revenue service is provided over 71.5 miles of double mainline track, of which approximately 20 miles are in subway, 24 elevated, and 27 at grade.

Stations: There are 34 stations including 14 in subway, 13 elevated, and 7 at grade. Average station spacing is between 1/2 to 1 mile within and adjacent to San Francisco, Oakland, and Berkeley downtown areas, and 2 to 4 miles apart in suburban areas. Automatic fare collection equipment is located in each station to vend and process patron tickets. As of June 1987, BART provides 24,209 free paved parking spaces at 23 stations and 190 paved spaces at one additional station at a daily charge of 25¢ per space.

Maintenance Facilities: Equipment maintenance is performed at three Eastbay yards located in Hayward, Concord, and Richmond. A special track geometric vehicle is used to analyze the running rails and electrical third rail. Maintenance of right-of-way is routinely performed during off-revenue hours.

Administrative/Central Control Center: Trains are automatically controlled by wayside equipment and supervised by the central computer at BART headquarters located above the Lake Merritt Station in Oakland. Operators on board the leading A-car of each train have full voice communication with central control personnel and passengers on board, and can override automatic controls should the need arise.

ROLLING STOCK

Fleet Inventory: As of June 1987, BART owns 137 control equipped A-cars and 303 trail B-cars, of which 134 A-cars and all of the B-cars are in the operating fleet. Two A-cars are retained as engineering test vehicles. One additional A-car has been removed from the operating fleet as the result of heavy damage. Each vehicle contains 72 seats and is 10.5 feet wide. Vehicle lengths are 75 feet for A-cars and 70 feet for B-cars.

Trains: Train lengths range from 3 to 10 cars and consist of 2 A-cars (one at each end) and between 1 and 8 B-cars. Corresponding seating capacity is between 216 and 720 passengers. Top speed is 80 mph with a systemwide average of 33 mph, including station stops. Trains stop at each station along a designated route.

SERVICE HOURS

Rail: Rail service is provided between the hours of 5 am and 1:30 am Monday through Friday, 6 am to 1:30 am on Saturdays, and 9 am to 1:30 am on Sundays and major holidays. Closings for individual stations are timed with the schedule for the last train beginning at approximately midnight. Service frequencies (in minutes) for individual routes and line segments are as follows:

	TRANSBAY ROUTES			EASTBAY	CBD LINE SEGMENT	
	Concord-Daly City	Fremont-Daly City	Richmond-Daly City	Richmond-Fremont	San Francisco	Downtown Oakland
WEEKDAY						
Peak Hour	7.5	11	15	15	3.8**	3.8
Midday	15	15	15	15	5	5
Night	20	*	*	20	20	10
SATURDAY						
Daytime	20	20	20	20	6.7	6.7
Night	20	*	*	20	20	10
SUNDAY/HOLIDAY						
All Day	20	*	*	20	20	10

*Requires transfer between Concord/Daly City and Richmond/Fremont routes.
**3.0 minute headway service is operated during peak 15 minutes.

Express Bus: The District also provides express bus service within major travel corridors not served by rail in both Alameda and Contra Costa counties in the Eastbay. Bus service frequencies (in minutes) are as follows:

	Eastern Contra Costa	Western Contra Costa	Central Contra Costa-Alameda	Eastern Alameda
WEEKDAY				
Peak Hour	15	30	30	30
Midday	30	30	30	30
Night	60	60	60	60
SATURDAY				
Daytime	60	30	45	30
Night	60	60	60	60
SUNDAY/HOLIDAY				
All day	60	*	60	60

*No service during this time period.

(Continued on inside back cover)

1987

BAY AREA RAPID TRANSIT DISTRICT

FIVE YEAR PLAN

FOR THE PERIOD JULY 1987 THROUGH JUNE 1992

The preparation of this report has been financed in part through a grant from the United States Department of Transportation, Urban Mass Transportation Administration under the Urban Mass Transportation Act of 1964, as amended, as passed through the Metropolitan Transportation Commission.

The contents of this report reflect the views of BART, which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the original views or policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation.

August 1987

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

BOARD OF DIRECTORS

Margaret K. Pryor
President

Barclay Simpson
Vice President

Robert S. Allen

Nello Bianco

John Glenn

John H. Kirkwood

Arthur J. Shartsis

Arlo H. Smith

Wilfred T. Ussery

Keith Bernard
General Manager

Department of Planning, Budget and Research
Bay Area Rapid Transit District
800 Madison Street
Oakland, California 94607

TABLE OF CONTENTS

VOLUME II: CAPITAL IMPROVEMENT PLAN

SUMMARY S-1

INTRODUCTION

1 Capital Improvement Plan Purpose
1 Focus of Past Plans
2 Goals Addressed by This Year's Plan
2 Status of Projects
2 Organization of Document

CHAPTER I: PROGRAM DESCRIPTION

3 Basic System Requirements Projects
25 Capacity Expansion Projects
33 Station Access Projects
57 Extensions
60 Fremont-South Bay Corridor
63 Pittsburg-Antioch Corridor
66 West Contra Costa County Corridor
68 Livermore-Pleasanton Corridor
71 San Francisco Muni Metro Project

CHAPTER II: FINANCIAL PLAN

73 Description
73 Cash Flow Projections
73 Extensions
74 BART Reserves Projections

UNDER SEPARATE COVER

Volume I: Operations and Service Plan
Volume III: Appendices

SUMMARY

BART

BAY AREA RAPID TRANSIT DISTRICT
800 Madison Street
P.O. Box 12688
Oakland, CA 94604-2688
Telephone (415) 464-6000

August 1987

MARGARET K. PRYOR
PRESIDENT
BARCLAY SIMPSON
VICE-PRESIDENT
KEITH BERNARD
GENERAL MANAGER

DIRECTORS

BARCLAY SIMPSON
1ST DISTRICT
NELLO BIANCO
2ND DISTRICT
ARTHUR J. SHARTSIS
3RD DISTRICT
MARGARET K PRYOR
4TH DISTRICT
ROBERT S. ALLEN
5TH DISTRICT
JOHN GLENN
6TH DISTRICT
WILFRED T USSERY
7TH DISTRICT
ARLO HALE SMITH
8TH DISTRICT
JOHN H KIRKWOOD
9TH DISTRICT

TO: **BART PATRONS AND DISTRICT RESIDENTS:**

The 1987 Five Year Plan represents the strategy by which BART intends to maintain service quality, expand train and station access capacity, attract new riders, and balance its operating budget despite growing financial problems.

In developing the 1987 BART Five Year Plan, assumptions of the previous plan were reviewed and updated as appropriate in light of new conditions and information. Performance toward BART's FY 1986/87 objectives has generally been very favorable. Train service quality measures stand at or above designated standards. Other District objectives have been met or exceeded, with the significant exception of ridership projections. Since January 1986, patronage has not returned to the previous growth curve, even though service quality was very good during the same period.

Stable or falling ridership has characterized most of the transit industry in recent months. Speculation as to the causes of this phenomenon includes lower service quality, increased fares, lower gasoline prices, increased car pooling, and relocation of employment to suburban sites. It is not yet clear which of these factors are most significant or how they will affect future patronage trends.

Despite the recent leveling off of BART ridership, the long-run outlook for additional patronage is considered to be good. Regional growth is expected to continue, but comparable expansion of highway facilities which parallel BART is not planned. Therefore, BART will be positioned to serve a growing travel market as its train service capacity is increased.

This plan update reaffirms the need for the District's Capacity Expansion Program despite potential operating budget deficits. Through this program, BART train service frequency and capacity will be improved in a series of increments as major capital projects needed to support higher service levels are completed.

The anticipated implementation schedule, similar to that in the previous plan, is summarized on page S-10, including proposed additional trains and supporting car requirements. The plan calls for adding capacity in four phases. This is documented in Volume I of the plan.

Station access improvements are also programmed to augment the additional train capacity. In the longer run, planning for BART extensions has been making noticeable progress, particularly with the mandate to build a rail project from Bayfair to Dublin expressed by the voters of Alameda County in Measure B last fall. Access improvements, extension efforts, and other details of the capital improvement plan are described in Volume II.

The five-year operating budget projections underscore the critical need facing BART and all other transit operators for additional financial assistance. Growth in ridership, farebox revenue, and other sources of operating funds are not projected to match increases in operating expense. The plan identifies an eight-part strategy to balance operating sources and uses without another fare increase which would further diminish ridership. This strategy calls for BART to improve service, mount a comprehensive marketing program and to carefully review and cut where possible all expenses not related to providing service and stimulating ridership. These steps will support deficit reduction efforts but will not be sufficient alone. Additional funding sources must be identified through the regional financial planning effort currently being conducted by the Metropolitan Transportation Commission.

BART's mission is to provide safe, convenient, reliable, and cost-effective transportation. BART service has generally measured up very well by these criteria. As capacity is expanded to meet long-range regional transportation requirements, the challenge to BART is to increase its marketing efforts so that ridership response contributes to greater system utilization and financial self-sufficiency.

Keith Bernard

Keith Bernard
General Manager

Figure A

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT POLICY

PREAMBLE TO DISTRICT GOALS AND OBJECTIVES

Based on the 1957 BART Commission Report, the statutes that created BART, the 1962 Composite Report, and principles of prudent business management, it is the policy of the San Francisco Bay Area Rapid Transit District to:

1. Maximize the effectiveness and efficiency of its operations and bring the system to its full potential.
2. Maximize the return on its investments in property, rights-of-way, and facilities.
3. Expand its service area to become the operator of an integrated regional trunk-line transit system which effectively serves interested counties in the Bay Area.

DISTRICT GOALS

1. Operate scheduled 4-route weekday service with route headways of 15 minutes or less during peak and midday periods and expand service within feasible, technical, and financial limits including improved peak-hour frequency of service and capacity where needed.
2. Improve the reliability performance of the present BART system.
3. Continue to improve BART system and patron safety and emergency preparedness.
4. Increase system utilization by promoting BART travel for all purposes with special emphasis on offpeak and reverse commute trips.
5. Fund and implement the necessary capital improvements and replacements to the system.
6. Operate within available funds without incurring an unfunded deficit.
7. Maximize the contribution to operating costs from passenger revenues, consistent with reasonable fare levels, to achieve a farebox ratio above 50%.
8. Make every effort to achieve District objectives for female and minority employment and minority business enterprise participation.
9. Improve system access by means of a comprehensive program of parking expansion, BART feeder services, transit coordination, and special projects addressing elderly and handicapped mobility.
10. Develop station area sites for the realization of increased patronage and revenues, and to enhance the communities BART serves.
11. Extend BART trunk lines within Bay Area travel corridors where feasible and in support of regional land use policies.

Figure B

BART OBJECTIVES FOR FY 1987/88

Program Area A: BASIC SYSTEM SERVICE AND CAPACITY

1. Balance capacity where possible such that load factors for peak period trains which can be lengthened or shortened (consists between 3 and 10 cars) are relatively equal but not less than 1.00, and provide offpeak service such that no train load factor exceeds 1.05.
2. Operate weekday peak period Transbay service in the peak direction providing at least 98.0% of scheduled train throughput and 97.5% of scheduled car throughput on a monthly average basis.
3. Make available 106 A-cars and 272 B-cars for revenue service by 4 AM.

Program Area B: RELIABILITY

1. Complete 99% of all scheduled dispatches.
2. Conduct operations such that 95% of daily terminal-to-terminal runs are completed within 5 minutes of scheduled run times with at least 93% during AM and PM peak periods for commute days.
3. Provide service such that no more than 2% of peak period trains experience a primary delay exceeding 7 minutes and no more than 6% experience a delay from any cause exceeding 7 minutes.
4. Conduct operations such that 94% of all patron trips are completed on-time. All patron trips are on-time when trains run not more than 5 minutes late or 60 seconds early.
5. Provide service such that passenger offload rates remain at or below the following: vehicle equipment = 1.00; wayside equipment = 0.08; operations and other = 0.40; and the total = 1.48 (per 1,000 car hours).
6. Maintain the overall AFC technician maintenance incident rate at or below 0.30 incidents per 1,000 passenger trips, and maintain or exceed a 6 AM average weekday availability rate of 95% for entry/exit gates and 90% for ticket vendors.
7. Maintain a 6 AM average weekday availability of 98% for elevators and 95% for escalators.
8. Maintain express bus on-time performance such that 95% of all runs arrive at their final destination within 5 minutes of schedule.

Figure B (Continued)

BART OBJECTIVES FOR FY 1987/88

Program Area C: SAFETY AND SECURITY

1. Continue to provide an environment for patron circulation through trains and stations such that the accident rate does not exceed 17.7 per million passengers.

2. Reduce the total annual amount of employee lost time due to injuries as a percent of time worked to 0.50% or less.

3. Conduct a minimum of one emergency plan exercise per month involving emergency response agencies.

Program Area D: PATRONAGE AND TRAVEL PROMOTION

1. At a minimum, achieve normal growth projections for average daily patronage as follows (in 1,000's):

	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	FY 87/88
Average Weekday:	199.2	201.0	199.0	204.6	201.1
4-hour Peak:	96.2	99.8	98.3	100.6	98.8
Offpeak:	103.0	101.2	100.7	104.0	102.3
Saturday:	80.0	88.0	82.0	84.0	83.5
Sunday:	48.3	48.6	48.9	49.1	48.7

2. Maintain at least 150 offsite ticket outlets at banks and retail establishments available to the general public, in addition to employer distribution program, with adequate coverage throughout the District.

Figure B (Continued)

BART OBJECTIVES FOR FY 1987/88

Program Area E: FINANCIAL AND OPERATIONAL EFFICIENCY

1. Maintain a funded budget and farebox ratios of no less than 10.3% for BART express bus operations, 50.2% for rail operations, and 46.1% for system-wide operations.
2. Maintain a system operating ratio of no less than 49.9%.
3. Maintain a rail cost per passenger mile of 21.3¢ or less.
4. Achieve a level of service output such that 15,000 vehicle miles are produced per equivalent District employee (based on 2,000 hours worked, including overtime and excluding capitalized labor).
5. Improve system utilization (passenger miles per seat mile) to 33.7% through continued monitoring of train capacity to match passenger demand patterns.
6. Maintain a paid sick leave rate of no more than 3.5% (9.1 paid days) annually per employee.
7. Transmit key performance reports to the Board of Directors, Department Managers, and/or other recipients within the following number of working days after the close of each reporting period: Monthly Patronage Report (10), Monthly Budget Performance Report and Quarterly Affirmative Action Report (15), Quarterly Financial Statements (25), Quarterly Performance Report on System Objectives (35), Quarterly Operations Performance Report (45), and the Annual Report (75).
8. Reduce the number of District objectives by 25%.

Program Area F: AFFIRMATIVE ACTION

1. Work to increase the workforce representation of women and minorities into targeted job categories from 20.0% in June 1986 to 22.1% by June 1988 in accordance with the 1987/91 Affirmative Action Plan.
2. Work to achieve 21% minority business enterprise participation for all District contracts determined to have MBE opportunities, with 18% DBE and 3% WBE participation for federally assisted contracts.
3. Work to achieve not less than 15% equity participation in District Joint Development Projects by women and minority individuals and/or business enterprises.

Figure B (Continued)

BART OBJECTIVES FOR FY 1987/88

Program Area G: SYSTEM ACCESS

1. Provide 1,894 new BART-owned paved parking spaces at existing rail stations.
2. Acquire funding for Pleasant Hill Station parking structure and initiate engineering design.
3. Initiate engineering design of Concord Station parking structure.
4. Advocate achievement of __% of BART/AC bus connections with coordinated schedules. (Level to be determined jointly with AC Transit as part of its route restructuring program).
5. Implement streamlining in the West and East Corridors.
6. Implement Express Bus/Rail ticket.
7. Complete 75% of station elevator conversions.
8. Complete platform edge installations at all stations.

Program Area H: JOINT DEVELOPMENT

1. Complete station area plans at Concord and MacArthur Stations, assuming local government cooperation.
2. Initiate station area planning process at Bayfair, El Cerrito del Norte, and El Cerrito Plaza Stations.
3. Assuming favorable market conditions, negotiate an acceptable ground lease agreement at at least one of the above sites.

Program Area I: EXTENSIONS

1. Complete the Fremont-South Bay Corridor Alternatives Analysis/Draft Environmental Impact Report.
2. Complete acquisition of at least three extension sites.
3. Complete the Pittsburg-Antioch Corridor Alternatives Analysis/Draft Environmental Impact Statement/Draft Environmental Impact Report.

BART OBJECTIVES FOR FY 1988/89 THROUGH 1991/92

Program Area A: BASIC SYSTEM SERVICE AND CAPACITY

- Operate 4-route weekday service with the capability of providing sustained 3 minute 10 second-headways by September 1988 following the completion of the Daly City Turnback reducing to 2 minutes 30 seconds by September 1989, and 2 minutes 15 seconds by September 1990 following the completion of remaining capacity expansion projects.

- Support the following weekday car requirements (as of the fourth quarter of each fiscal year):

Service Requirements	1989	1990	1991	1992
A-Cars	100	78	92	114
B-Cars	271	256	268	272
C-Cars	82	128	128	128
TOTAL	453	462	488	514
Service Distribution				
On-Line	396	400	426	452
Spares	57	62	62	62
TOTAL	453	462	488	514
Total Fleet				
A-Cars	135	135	135	135
B-Cars	303	303	303	303
C-Cars	96	150	150	150
TOTAL	534	588	588	588

Program Area B: RELIABILITY

- At a minimum, maintain current reliability objective level performance under higher density train operations.

Program Area C: SAFETY AND SECURITY

- Maintain current levels of patron and employee safety as measured by the patron accident rate and lost-time injury rate objectives.

Program Area D: PATRONAGE AND TRAVEL PROMOTION

- Maintain acceptable quality of service as reflected by accuracy of service announcements, employee helpfulness, and station cleanliness in support of achieving the following patronage levels (in 1000's):

	FY 88/89	FY 89/90	FY 90/91	FY 91/92
Average Weekday:	210,192	217,158	225,198	233,691
4-Hour Peak:	105,363	109,690	115,027	120,762
Offpeak:	104,829	107,468	110,171	112,929
Saturday:	85,603	87,758	89,965	92,217
Sunday:	49,937	51,194	52,482	53,795

- In addition to FY 1987/88 offsite ticket outlets, increase the number of outlets by 25 each fiscal year.

Figure C (Continued)

BART OBJECTIVES FOR FY 1988/89 THROUGH 1991/92

Program Area E: FINANCIAL AND OPERATIONAL EFFICIENCY

- Continue to provide cost-effective and efficient service through the achievement of key financial and operational efficiency objectives.

Program Area F: AFFIRMATIVE ACTION

- Work to increase the workforce representation of women and minorities into targeted job categories from 22.1% by June 1988 to 28.7% by June 1991 in accordance with the 1987-1991 Affirmative Action Plan.

Program Area G: SYSTEM ACCESS

- Complete parking redesign and surface parking projects.
- Complete parking facilities at Pleasant Hill and Concord.
- Complete Daly City Intermodal Facility.
- Complete park/ride lots in Dublin/Pleasanton, West Livermore, West Antioch, Pittsburg, and Hercules.
- Continue streamlining express bus service.
- Complete remaining 25% of station elevator conversions.

Program Area H: JOINT DEVELOPMENT

- Continue station area planning efforts in preparation for marketing specific sites for development.
- Market specific sites as market conditions and local plans permit.

Program Area I: EXTENSIONS

- Continue to implement the Extension Right-of-Way Acquisition Program.
- Complete the Alternatives Analysis and Final Environmental Impact Requirements for Phase I of the BART Extension Staging Policy.

FIGURE D

BART CAPACITY EXPANSION PROGRAM

6/15/87

Minimum Headway Capability (Min:Sec)	Projects Required To Achieve or Support This Headway	Anticipated Project Completion Dates	Target Expanded Service Start Dates	Peak Hour Trains Peak Direction Transbay	Peak Period Capacity Trains		On-Line Cars	Spare Cars	Total Cars Required	Available Fleet A/C-Cars @85% B-Cars @90% (Extra)	Operating Fleet Size	
3:45 (except for 3:00 during peak 15 minutes)	Current Service	---	Nov 86	17	45	A B T	90 248 338	16 24 40	106 272 378	113 (+7) 272 (+0) 385 (+7)	134 303 437[d]	A B T
	Delivery of 48 C-Cars	Dec 87	Jan 88	17	45	A C B T	76 41 248 365	16 0 24 40	92 41 272 405	114 (+22) 41 272 427 (+22)	135[e] 48 303 486	A C B T
3:10	Removal of Vent Separation	Oct 87										
	Electrical Capacity Increase: - Install 3rd Rail - Yard Feeder	Dec 87 Mar 88										
	Daly City Turnback	Apr 88										
	Delivery of 48 Additional C-cars (96 total)	Jun 88	Sep 88	19	51[f]	A C B T	86 76 234 396[f]	14 6 37 57	100 82 271 453	114 (+14) 82 272 (+1) 468 (+15)	135 96 303 534	A C B T
2:30	Daly City Yard	Jul 88										
	New On-Board ATC (A-Car Retrofit)	Jul 88										
	M-87 Interlocking	Dec 88										
	Delivery of 54 Additional C-Cars (150 total)	Dec 88										
	Wayside Train Control/System Performance Mods	Jul 89										
	Electrical Capacity Increase: - Procure/Install Substation	Sep 89	Sep 89	21	50[h]	A C B T	70 116 214 400[h]	8 12 42 62	78 128 256 462	114 (+36) 128 272 (+16) 514 (+52)	135 150 303 588	A C B T
	ICS	TBD[g]										
2:15	Brake Rate Algorithm Modifications	June 90	Sep 90	24[h]	53[i]	A C B T	78 122 226 426[i]	14 6 42 62	92 128 268 488	114 (+22) 128 272 (+4) 514 (+26)	135 150 303 588	A C B T

FOOTNOTES TO CAPACITY EXPANSION PROGRAM (Figure D)

[d] Status as of January 31, 1987; reflects 2 A-cars in use as engineering test vehicles and one A out for accident damage.

[e] Accident damaged A assumed to be repaired.

[f] Reflects addition of 3 trains and 13 cars on-line during peak; also includes 3 extra trains comprised of 18 cars and required for operation of Daly City Turnback (prior to system resignaling) which do not increase actual capacity during regular peak cycle.

[g] ICS is shown as necessary to support 2:30 headways assuming that more than 54 trains are required at this service level. Current plans are to operate less than 54 trains when this service increment commences. The planned upgrade to the existing train control computer is designed to accomodate up to 54 trains.

[h] Reflects addition of 2 trains and 22 cars on-line during peak (note: assumes requirement for 3 trains in Daly City Turnback is offset through resignaling).

[i] Reflects 3 trains and 26 cars in September 1990 with start of 2:15 headways. In the next and last year of the plan (FY 91/92), one additional train is projected bringing the peak hour Transbay count to 25 and the total trains on the system to 54. Car requirements during FY 91/92 are expected to increase by 26, bringing the total on-line to 452 and the total required including spares to 514 which equals the projected total cars available.

Figure E

1987 BART FIVE YEAR PLAN OPERATING PARAMETERS AND FORECASTS

	BUDGETED	F O R E C A S T			
SERVICE DELIVERY	FY 1987/88	FY 1988/89	FY 1989/90	FY 1990/91	FY 1991/92
Minimum Scheduled Headway (min:sec)*	3:45**	3:10	2:30	2:15	2:15
Peak Period Trains Online*	45	48	50	54	54
Peak Period Cars Online*	365	396	400	426	452
Car Hours (1,000's)	1,103	1,151	1,113	1,155	1,208
Car Miles (1,000's)	30,203	31,516	30,499	31,631	33,083
PATRON RESPONSE					
Total Passenger Trips (1,000's)	58,369	60,773	62,731	64,969	67,327
Average Weekday Trips (1,000's)	201	210	217	225	234
Passenger Miles (1,000's)	733,600	762,701	787,274	815,361	844,954
FINANCIAL RESULT					
Total Operating Expense (1,000's)	$171,810	$187,320	$199,340	$211,341	$223,742
System Operating Ratio	49.9%	47.3%	45.6%	44.5%	43.5%
Rail Farebox Ratio	50.2%	48.2%	46.6%	45.4%	44.3%
Rail Cost Per Passenger Mile	21.3¢	22.4¢	23.2¢	23.8¢	24.4¢
DISTRICT STAFFING					
Headcount#	2,364.5	2,453.5	2,482.5	2,502.5	2,513.5

---

*Maximum service level programmed during respective fiscal years.
**Except for 3:00 headway during peak 15 minutes.
#Includes capitalized and other reimbursable positions as of June each fiscal year.

Figure F

BART FIVE-YEAR OPERATING BUDGET PROJECTIONS SUMMARY

($ Millions)

	86/87 ACTUAL	87/88	88/89	89/90	90/91	91/92
REVENUES						
Net Passenger Revenue	77.7	79.2	83.4	86.1	89.1	92.4
Other Operating Revenue	6.9	6.5	5.1	4.8	4.9	4.9
Total Net Operating Revenues	84.6	85.7	88.5	90.9	94.0	97.3
EXPENSES						
Net Labor	110.9	115.3	127.0	135.3	143.2	151.3
Electric Power	17.1	18.1	20.1	21.9	23.7	25.6
Purchased Transportation	15.3	15.7	16.1	16.6	17.0	17.6
Other Nonlabor	18.9	22.7	24.1	25.5	27.4	29.3
Total Operating Expenses	162.2	171.8	187.3	199.3	211.3	223.8
OPERATING DEFICIT	(77.6)	(86.1)	(98.8)	(108.4)	(117.3)	(126.5)
FINANCIAL ASSISTANCE						
Property & Sales Tax	94.5	96.7	101.6	106.6	112.0	117.6
TDA & STA	1.1	2.3	0.4	0.4	0.4	0.4
Debt Service Allocations	(13.5)	(12.6)	(14.5)	(14.5)	(14.6)	(14.6)
Capital & Other Allocations	(4.5)	(4.7)	(4.9)	(5.1)	(5.3)	(5.5)
Total Financial Assistance	77.6	81.7	82.6	87.4	92.5	97.9
NET FINANCIAL RESULT	(0.03)	(4.4)	(16.2)	(21.0)	(24.8)	(28.6)
FINANCIAL INDICATORS						
Rail Farebox Ratio	52.4%	50.2%	48.2%	46.6%	45.4%	44.3%
System Operating Ratio	52.2%	49.9%	47.3%	45.6%	44.5%	43.5%
Rail Cost Per Passenger Mile	21.1¢	21.3¢	22.4¢	23.2¢	23.8¢	24.4¢

Figure G

FIVE-YEAR CAPITAL PROGRAM SUMMARY

Expenditures, Cash Flow Basis

(000)

	Prior* Years	Budgeted FY 87/88	Projected FY 88/89	Projected FY 89/90	Projected FY 90/91	Projected FY 91/92	Projected Within 5 Year	Cumulative Total
Vehicle								
Funded	36,150	105,089	92,498	8,524	0	0	0	242,261
Unfunded	0	0	0	0	0	0	0	0
Facilities, Mainline								
Funded	96,295	58,823	10,922	735	0	0	0	166,775
Unfunded	0	23,253	38,973	5,000	0	0	0	67,226
Facilities, Station & Access								
Funded	24,309	31,435	12,786	0	0	0	33,788	102,318
Unfunded	0	270	9,256	9,553	3,000	4,000	111,935	138,014
Facilities, Support								
Funded	0	77	0	0	0	0	0	77
Unfunded	300	541	0	0	0	0	0	841
Train Control								
Funded	29,165	18,208	6,674	765	0	0	0	54,812
Unfunded	0	0	0	0	0	0	0	0
AFC & Communication								
Funded	4,023	1,239	472	0	0	0	0	5,734
Unfunded	0	1,990	0	0	0	0	0	1,990
Electrification								
Funded	1,751	3,322	4,268	0	0	0	0	9,341
Unfunded	0	756	1,210	0	0	0	0	1,966
Procurements								
Funded	0	1,873	0	307	0	0	0	2,180
Unfunded	0	0	5,103	200	0	0	0	5,303
Other Categories								
Funded	21,753	25,819	24,751	9,318	11,172	17,309	5,789	115,911
Unfunded	0	0	0	0	0	0	0	0
ALL CATEGORIES								
Funded	213,446	245,885	152,371	19,649	11,172	17,309	39,577	699,409
Unfunded	300	26,810	54,542	14,753	3,000	4,000	111,935	215,340
GRAND TOTAL	**213,746**	**272,695**	**206,913**	**34,402**	**14,172**	**21,309**	**151,512**	**914,749**

* Prior Years Expenditures on Active Projects

Figure H

FIVE-YEAR CAPITAL PROGRAM SUMMARY

Sources, Cash Flow Basis

(000)

	Prior* Years	Budgeted FY 87/88	Projected FY 88/89	Projected FY 89/90	Projected FY 90/91	Projected FY 91/92	Projected Within 5 Year	Cumulative Total
UMTA Funds								
Funded	106,982	110,234	66,536	7,118	0	0	0	290,870
Unfunded	0	1,231	9,727	160	800	3,200	78,794	93,912
State Funds								
Funded	18,260	19,548	13,762	1,454	0	0	0	53,024
Unfunded	0	4,983	7,517	0	0	0	0	12,500
Regional Funds								
Funded	10,723	5,525	2,249	383	0	0	0	18,880
Unfunded	0	2,572	4,919	40	200	800	19,698	28,229
BARTD Funds								
Funded	77,481	110,578	69,824	10,694	11,172	17,309	39,577	336,635
Unfunded	300	18,024	32,379	14,553	2,000	0	13,443	80,699
ALL SOURCES								
Funded	213,446	245,885	152,371	19,649	11,172	17,309	39,577	699,409
Unfunded	300	26,810	54,542	14,753	3,000	4,000	111,935	215,340
GRAND TOTAL	**213,746**	**272,695**	**206,913**	**34,402**	**14,172**	**21,309**	**151,512**	**914,749**

* Prior Years Expenditures on Active Projects

INTRODUCTION

CAPITAL IMPROVEMENT PLAN PURPOSE

This year's Five Year Plan (FYP) is significantly different from those of the past few years. BART is nearing a turning point in its development. The Capital Improvement Plan (Volume II) of the FYP has been written as a separate volume to reflect the emphasis of the next few years on funding projects to support full utilization of the valuable asset represented by the basic BART system. This document describes the shift in focus in the capital plan, shows how the group of projects described here supports District goals, and discusses the financial viability of the plan in the final section.

FOCUS OF PAST PLANS

In the past 5 to 6 years the principal focus of the capital component to the FYP has been on the Capacity Expansion Program. This is a set of projects aimed at allowing the original BART system to accommodate the maximum achievable capacity. At the same time, projects that supported improved safety, reliability, and maintenance of the existing physical plant were included. Access and extension projects were included, but were secondary to the more important basic system/capacity expansion projects.

Last year (1986) represented a milestone. It was the first year that funding for the Capacity Expansion Program was virtually assured. It also marked the completion of some of the projects in this program. All of the projects in the program are now well underway or complete.

This year's plan focuses on four areas. First, it continues to emphasize projects that support the continuation of efficient, reliable, and safe service on the basic system. Without maintaining the current physical plant, service can deteriorate.

The second area of emphasis in the plan remains the Capacity Expansion Program. Given that funding is virtually complete for this set of projects, the plan emphasizes the progress on implementing these projects.

Once the Capacity Expansion Program is complete, BART will become even more access constrained than at present. Parking and access projects are the third program area and will become critical to allowing patrons to take advantage of the expanded carrying capacity. Thus, this year's plan contains a section which emphasizes the access program in detail.

Finally, as BART moves toward providing the best possible service on the basic system, demand for extensions of service gain greater importance. Funding for extensions will require significant public and legislative support. This year's plan contains a detailed description of the extension program.

GOALS ADDRESSED BY THIS YEAR'S PLAN

The goals detailed in Volume I of the FYP serve as the foundation for the Capital Improvement Plan covered here. The goals which are most directly supported by the plan are:

- Operate scheduled 4-route weekday service with route headways of 15 minutes or less during peak and midday periods and expand service within feasible, technical, and financial limits including improved peak-hour frequency of service and capacity where needed.
- Improve the reliability and performance of the present BART system.
- Continue to improve BART system and patron safety and emergency preparedness.
- Fund and implement the necessary capital improvements and replacements to the system.
- Improve system access by means of a comprehensive program of parking expansion, BART feeder services, transit coordination, and special projects addressing elderly and handicapped mobility.
- Develop station area sites for the realization of increased patronage and revenues, and to enhance the communities BART serves.
- Extend BART trunk lines within Bay Area travel corridors where feasible and in support of regional land use policies.

Each project in the plan addresses a goal in some way. Many projects address more than one goal. For example, Rail Replacement is a project in the program designed to continue basic service. There are a number of other projects that are necessary for continued safe, reliable service on the basic system. The Capacity Expansion Program allows improved utilization of the existing physical facility. The link between improved access, extension projects and the specific goals that relate to these programs is clearly delineated.

STATUS OF PROJECTS

All projects discussed are subject to state and federal environmental review as required by law. Specific projects and project funding are subject to approval by the District's Board of Directors. Reference to projects that do not yet satisfy these requirements are proposed projects.

ORGANIZATION OF THIS DOCUMENT

The remainder of this document is made up of two chapters. The first provides detailed descriptions for the projects in each of the four areas discussed above. The areas are Basic System Requirements Projects, Capacity Expansion Projects, Station Access Projects, and finally Extensions. The second chapter provides a detailed financial plan for the projects. Cash flows for all projects except extension implementation are provided. Summaries of cash requirements by funding source are provided as well as a projection of BART capital reserves.

CHAPTER I

PROGRAM DESCRIPTION

BASIC SYSTEM REQUIREMENTS PROJECTS

The Basic System Requirements are made up of projects that maintain the basic (71-mile) system physical plant, satisfy system safety requirements, and enhance system efficiency. Figure 1 is a listing of these projects. The list of projects is shown in order of FMS (Financial Management System) number.

Most of the projects in the table are funded and many are underway. Following the table are project descriptions and justifications which are also arranged in order of FMS number. Some project justifications are considerably more detailed than others because these projects were submitted to the Metropolitan Transportation Commission (MTC) capital priorities process for funding. These project descriptions are more detailed in order to provide funding agencies enough information to perform an evaluation of the projects for funding decisions.

PHOTOGRAPH: CONCORD TRANSIT VEHICLE MAINTENANCE SHOP

THE CONCORD SHOP SUPPORTS BASIC TRANSIT VEHICLE MAINTENANCE.

Figure 1

BASIC SYSTEM PROJECTS

$ 000

FMS#	PROJECTS	FUNDED	UNFUNDED	TOTAL
01NK	EMPLOYEE BREAK ROOM-HAYWARD	$44	$0	$44
01RB	VEHICLE WASHER- HAYWARD	$45	$0	$45
(01RM, 03PH & 05NF)	TRAIN OPERATOR BREAK ROOM MODS	$0	$841	$841
01SO	CONSOLIDATE COMPONENT REPAIR SHOP	$235	$0	$235
01ST	CANOPY STORAGE SHED - HAYWARD YARD	$58	$0	$58
03FK	2D POWR TRANSFRMR-E. PORTAL-BERK. HILLS TUNNEL	$259	$0	$259
03FL	BOOSTER FIRE PUMP-W. PORTAL-BERK. HILLS TUNNEL	$153	$0	$153
(03PJ & 05NJ)	EXPAND TRAIN CONTROL ROOMS-TWO YARDS	$116	$0	$116
03RB	PATRON EXITING MODIFICATIONS-CONCORD STATION	$136	$0	$136
09FE	REPLACE PCB TRANSFORMERS AT SAN FRANCISCO VENT	$728	$0	$728
10AJ	I-680 EXPRESS BUS ON-RAMPS PADS	$148	$0	$148
11FG	EMERGENCY STAIRWAY MODS-EMBARCADERO STATION	$387	$0	$387
11FH	STATION VENT FAN CONTROL MODS	$142	$0	$142
11JF&	PLAZA ENTRANCE FENCING-16TH & 24TH ST. STATNS	$80	$0	$80
11U-	DALY CITY INTERMODAL FACILITY	$1,800	$0	$1,800
15AZ	FIRE DEPARTMENT-CONNECTIONS-21 STATIONS	$1,218	$0	$1,218
(15CL & 15CM)	RAIL REPLACEMENT	$720	$0	$720
15EX	PG&E RATE EVAL.-ALTERNATIVE SOURCES ANALYSIS	$176	$0	$176
15LC&	ESCALATOR REHABILITATION PROGRAM	$6,082	$0	$6,082
15N-	HANDICAPPED ACCESSIBILITY MODS (PHASE IV)	$0	$420	$420
15NG	SELF OPERATING ELEVATORS-HANDICAPPED	$2,796	$0	$2,796
15NH	TEXTURED PLATFORM EDGE III	$1,343	$0	$1,343
15SA	UNDERGROUND STORAGE TANK MONITORS	$95	$0	$95
17BR	BART POLICE OFFICE MODS	$168	$0	$168
17BS	LAKE MERRITT FIFTH FLOOR REFURBISHMENT	$102	$0	$102
17BU	REMODEL TELEPHONE CENTER	$32	$0	$32
17FD	BUILDING MODS-MAINTENANCE	$129	$0	$129
17HF	METRO CENTER MODIFICATIONS	$32	$0	$32
20AC	ELIMINATE STATION INTERFACES	$2,400	$0	$2,400
20BF	TIMELOCKING MODIFICATIONS	$435	$0	$435
20FD	OPTIMIZE SPEED PROFILES	$489	$0	$489
20HB	STATION BACKUP POWER	$388	$1,966	$2,354
21EB&	YARD EFFICIENCY MODIFICATIONS	$319	$0	$319
27OB&	RADCOM	$3,735	$0	$3,735
41BU	REINSTALL SIXTH CAPACITOR & MODIFY OLR	$163	$0	$163
45AN	MULTI-DENOMINATIONAL BILL VALIDATORS	$151	$0	$151
45BF	IBM TICKET TRANSPORT RETROFIT	$1,675	$0	$1,675
45BK	MUNI FAST PASS ANTI-FRAUD MODIFICATIONS	$48	$0	$48
45CK	CUBIC GATE MODIFICATIONS-AC/BART PASS	$0	$670	$670
47BA	NINE VENDORS & EIGHT ADDFARES-2D GENERATION	$0	$1,320	$1,320
59CK	PLATFORM TRAIN SCHEDULE SIGNS	$143	$0	$143
65NB	COMM. & COMP. REP. AFC RELIABILITY REPORTING	$79	$0	$79
79--	REPLACEMENT MAINTENANCE EQUIPMENT	$0	$1,200	$1,200
79B-	REPLACE OVERAGE SEDANS & MAINT. VEHICLES	$0	$4,103	$4,103
79KF	NEW SAFETY EQUIPMENT	$76	$0	$76
79LC	PORTABLE RADIOS	$46	$0	$46
79MP	RAIL GRINDER	$992	$0	$992

Figure 1

BASIC SYSTEM PROJECTS

$ 000

FMS#	PROJECTS	FUNDED	UNFUNDED	TOTAL
93DP	INVENTORY BUILDUP	$23,407	$0	$23,407
99*15	SYSTEM SAFETY UPGRADE PHASE III	$0	$5,000	$5,000
99*50	LAND & LAND RIGHTS	$121	$0	$121
99*51	AGENCY AND UTILITY AGREEMENTS	$1,523	$0	$1,523
99*52	OTHER COSTS (INS., BOND AGENTS, ETC.)	$1,870	$0	$1,870
99*54	OUTSTANDING CLAIMS	$3,996	$0	$3,996
99*55	PROJECT DEVELOPMENT	$20,000	$0	$20,000
99*56	PLANNING & STATION AREA DEVELOPMENT	$10,288	$0	$10,288
99*59	STATION AREA DEVELPMNT INFRASTRCTR IMPS.	$5,306	$0	$5,306
99*66	IMPROVEMENT ALLOWANCE ALLOCATION	$19,600	$0	$19,600
99*84	ENTRANCE CANOPIES	$8,000	$0	$8,000
	TOTAL	$122,474	$15,520	$137,994

EMPLOYEE BREAK ROOM - HAYWARD (01NK)

PROJECT DESCRIPTION:

The purpose of this project is to provide a break room at Hayward Station to be used by station agents. It would include modifying an existing room in the station and installation of basic facilities.

PROJECT JUSTIFICATION:

Presently, station agents at Hayward Station must take their breaks either in the restroom or leave the station area altogether.

VEHICLE WASHER - HAYWARD (01RB)

PROJECT DESCRIPTION:

The purpose of this project is to provide an area to hand wash the entire fleet of transit vehicles on an ongoing basis.

PROJECT JUSTIFICATION:

The present fleet of transit vehicles experience oxidation on the aluminum car exteriors. This project would allow hand washing each vehicle with a special solution to remove this oxidation.

TRAIN OPERATOR BREAK ROOM MODIFICATIONS (01RM, 03PH, 05NF)

PROJECT DESCRIPTION:

This project will provide additional locker, restroom, and break room facilities at three East Bay Yards.

PROJECT JUSTIFICATION:

All three BART train yards have a transportation building for train operators, transportation supervisors and clerical support staff. This facility provides a combination kitchen/lunchroom with space for vending machines, and table and chairs, separate restrooms and locker rooms for male and female train operators, and office space for administrative personnel. These transportation buildings provide a place for train operators to prepare for shift check in and out, where lunches and breaks are taken and where a variety of administrative matters are handled.

When the BART system was built, there was an estimate made of required capacity for break rooms. It was based on train run times and the expected number of operators required to operate trains. The original estimates have proved wrong due to several factors. For example, the travel time (from one end of a line to another) has increased since the original design. Work rules require a break between runs which was not originally envisioned. Another example is that the number of train operators required for yard operations is more than originally planned.

Consequently, it takes many more train operators to run current service than was originally planned. Thus, the train operator break rooms are not suitable for even current operations.

There are approximately 250 train operators at BART. When peak revenue service expands, approximately 30 additional train operators will be required. The transportation facilities are overcrowded with some lockers housed in restrooms. With the addition of 30 train operators, the situation will worsen. Additionally, separate restroom facilities for men and women arerequired.

This project rehabilitates and expands current transportation buildings for maintaining existing levels of service by providing for adequate restroom and locker capacity for train operators who operate the trains.

CONSOLIDATE COMPONENT REPAIR SHOP (01SO)

PROJECT DESCRIPTION:

With the completion of the new storeroom at Hayward Shop, the old storeroom area has become available. This area is adjacent to the major component repair activities at the Hayward Shop and provides a means to consolidate all remote component repair activities and accommodate the additional work space required to support the new equipment on the C-Car.

PROJECT JUSTIFICATION:

Consolidation will improve efficiency and support C-Car activities.

CANOPY STORAGE SHED-HAYWARD YARD (01ST)

PROJECT DESCRIPTION:

This project is to extend the canopy storage shed at Hayward Yard in order to provide additional storage capability.

PROJECT JUSTIFICATION:

This construction is required to protect inventory parts from deterioration due to exposure to the elements.

2D POWER TRANSFORMER - E. PORTAL BERKELEY HILLS TUNNEL (03FK)

PROJECT DESCRIPTION:

This project is to install a second primary transformer supplying power to the Berkeley Hills Tunnel (BHT).

PROJECT JUSTIFICATION:

This modification will eliminate the possibility of a single point failure which could disable all auxiliary power for the BHT such as emergency ventilation, lighting systems and radio systems.

BOOSTER FIRE PUMP - W. PORTAL BERKELEY HILLS TUNNEL (03FL)

PROJECT DESCRIPTION:

This project provides for an additional booster pump at the west portal of the Berkeley Hills Tunnel (BHT) to supply additional water pressure when needed.

PROJECT JUSTIFICATION:

As part of the overall wayside emergency facilities improvements, the existing fire main has been sectionalized. In the event that conditions require the main to be sectionalized (i.e., valves closed), this modification will allow the fire departments to boost water pressure west of that point.

EXPAND TRAIN CONTROL ROOMS - CONCORD & RICHMOND YARDS (03PJ & 05NJ)

PROJECT DESCRIPTION:

This project expands existing train control room facilities at Concord and Richmond Yards.

PROJECT JUSTIFICATION:

Additions to the train control rooms at Concord and Richmond Yards is needed to accommodate automatic train control (ATC) maintenance personnel who are displaced from their work area by Integrated Control System (ICS) equipment added to those train control rooms. Installation of ICS equipment is part of the Capacity Expansion Program.

PATRON EXITING MODIFICATIONS - CONCORD STATION (03RB)

PROJECT DESCRIPTION:

Add an additional stairway at Concord Station to accommodate increases in patronage.

PROJECT JUSTIFICATION:

This project is to add one platform stairway at Concord Station in order to improve station access. Two factors contribute to this access deficiency. First, BART will implement closer headways on all lines resulting from the Capacity Expansion program which means that passengers will offboard in stations at more frequent intervals. Thus, the project continues system improvements to provide increased capacity. There has been concern regarding the adequate capability for BART stations to handle increased exiting patron loads. Second, business development in the Concord Station area is creating a reverse commute which will require improved station access for the reverse flow of patrons.

It is therefore in the best interest of the patron that an additional stairway be constructed. During peak periods, the additional stairway will better accommodate the reverse passenger flow and minimize disruption of normal patron exiting. This project is one of three access projects proposed for Concord Station. The other two projects are parking facilities.

REPLACE PCB TRANSFORMERS AT SAN FRANCISCO VENT (09FE)

PROJECT DESCRIPTION:

The purpose of this project is to replace the two traction power transformers at the San Francisco Vent Structure which contain large quantities of PCB cooling oil.

PROJECT JUSTIFICATION:

State and federal regulatory agencies have identified PCB as an "extremely hazardous material." Implementation of this modification will improve the District's overall safety position as well as assist the City of San Francisco in its efforts to remove PCBs from their city.

I-680 EXPRESS BUS ON RAMP PADS (10AJ)

PROJECT DESCRIPTION:

Construction of bus loading/unloading pads alongside I-680 freeway access ramps.

PROJECT JUSTIFICATION:

This project will facilitate streamlining of Express Bus service in the I-680 corridor from a local streets and road orientation to a more direct, higher speed freeway operation.

EMERGENCY & PATRON STAIRWAY MODS - EMBARCADERO STATION (11FG)

PROJECT DESCRIPTION:

Build two 4-foot wide stairways from the platform to the mezzanine (one at each end of the station).

PROJECT JUSTIFICATION:

As a result of the 1979 fire in the Transbay Tube, BART embarked upon a program to improve the fire resistance of the BART vehicle, evaluate evacuation times, and evaluate wayside emergency response equipment. A number of improvements resulted from that effort, as well as several recommendations. In regards to this project, a Gage-Babcock (consultant) study recommended additional exiting facilities for certain BART stations. BART's safety evaluation concluded that exiting from the Embarcadero Station should be improved. This project would provide modification of the Embarcadero Station to bring emergency egress time within the mean for underground stations. As such, it continues the improvements in fire and life safety that were begun following the fire.

Based on an analysis of exit time to exit platforms and stations, Gage-Babcock found that the Embarcadero Station exit time was outside normal exit times. Adequate exit capability from Embarcadero Station is important because this station is underground and provides access and egress to incidents in the transbay tube.

To improve passenger exit times, this project would provide two stairways from the platform to the concourse level. The stairways would be built in "shafts" at either end of the station and share this space with the hanging artwork. For additional passenger convenience, the stairs would open into the paid area on the concourse level allowing for additional use by patrons during non-emergency times.

STATION VENT FAN CONTROL MODS (11FH)

PROJECT DESCRIPTION:

This project will modify vent fan control at selected stations to allow control by the station agent from the agent's booth.

PROJECT JUSTIFICATION:

These modifications will allow more flexibility in smoke control in the event of an emergency in an underground station. The modifications were recommended as part of the Gage-Babcock study which was undertaken after the 1979 Transbay Tube fire.

PLAZA ENTRANCE FENCING - 16TH & 24TH STREET STATIONS (11JF&)

PROJECT DESCRIPTION:

The purpose of this project is to install protective fences around the plaza level of both station entrances.

PROJECT JUSTIFICATION:

BART records show numerous complaints from station agents, patrons, and department managers about the potential hazards created by patrons sitting and lying on the wall around these station entrances. Evaluation by the Civil Structural Design Department has shown that fencing these areas is the most cost effective way to eliminate this hazard and yet maintain the original aesthetics of the stations.

DALY CITY INTERMODAL FACILITY (11U-)

PROJECT DESCRIPTION:

This project involves a number of improvements to the pedestrian, auto and bus circulation systems at the Daly City Station including implementation of a one-way circulation pattern on the station roadways, relocate the bus terminal area, relocate the kiss/ride area, provide covered grade separated pedestrian accessways and restripe the parking garage.

PROJECT JUSTIFICATION:

The Daly City BART Station operates as the western terminal station of the BART system and is the busiest BART station outside of downtown San Francisco. The station currently experiences operational problems which impact both the station's function and transportation conditions in the surrounding area which this project is expected to alleviate.

FIRE DEPARTMENT CONNECTIONS - 21 STATIONS (15AZ)

PROJECT DESCRIPTION:

The modifications to be implemented by this project will correct several existing fire system deficiencies including additional fire department connections, additional hose cabinets, and the addition of a fire department connection and fire hydrant at the east portal of the Berkeley Hills Tunnel.

PROJECT JUSTIFICATION:

Improvement of these fire service facilities will significantly reduce fire service response time to emergencies within the District. These modifications originated with the Gage-Babcock & Associates recommendations which are endorsed by both the District's Emergency Wayside Task Force and the Fire Service Liaison Committee.

RAIL REPLACEMENT (15CL & 15CM)

PROJECT DESCRIPTION:

This project is part of an ongoing program to replace rail as it reaches the end of its life expectancy.

PROJECT JUSTIFICATION:

Due to BART trains traveling up to speeds of 80 mph, with an acceleration rate of 4.4 feet per second operating under a fully automated train control system, it is most important that the track structure be maintained at a level exceeding Federal Railway Administration and other transit systems safety standards.

PG&E RATE EVALUATION - ALTERNATIVE SOURCES ANALYSIS (15EX)

PROJECT DESCRIPTION:

The purpose of this project is to analyze the cost of power from sources other than PG&E.

PROJECT JUSTIFICATION:

BART has indications that it may be possible to obtain power from non-PG&E sources at a substantially lower cost than under PG&E rates. It is therefore important for BART to understand the feasibility and costs of its power purchase alternatives.

ESCALATOR REHABILITATION PROGRAM (15LC&)

PROJECT DESCRIPTION:

This project will provide for the rehabilitation of station escalators throughout the system.

PROJECT JUSTIFICATION:

District escalators have been operating approximately 20 hours per day for the last 10 to 12 years. Based on the increased shutdown for repairs, it is believed that District escalators are reaching their optimum life expectancy and require this major rehabilitation.

HANDICAPPED ACCESSIBILITY MODIFICATIONS (PHASE IV) (15N-)

PROJECT DESCRIPTION:

Provides for additional modifications such as communications and safety improvements for the hearing and vision-impaired, removal of station area pedestrian collision hazards for the benefit of the vision-impaired, the provision of barrier-free fare collection mechanisms for patrons in wheelchairs, and small projects such as curb cuts.

PROJECT JUSTIFICATION:

The hearing-impaired community is advocating implementation by BART of an electronic, visual-display information system on board rail cars for the communication of essential trip-making and safety messages. They argue that the lack of such a communication system improperly impedes access to the rail system for the hearing-impaired.

The vision-impaired community is likewise advocating implementation of an on-platform audible information system for the communication of essential trip-making and safety messages. It has been alleged that the lack of such audible information impedes access to the rail system.

The vision-impaired community is also advocating a program of station area pedestrian collision hazard removal and mitigation. They believe such changes could reduce the frequency and severity of accidents by the vision-impaired colliding with obstacles.

The conversion of BART station elevators to patron self-operation will be a significant accessibility improvement for patrons in wheelchairs when the station agent is unavailable to operate the elevator. Wheelchair patrons without considerable use of their arms and hands will continue to face difficulties in processing fare cards in the absence of a station agent. BART is evaluating various possibilities for resolving this situation.

While all BART station areas have been equipped with curb cuts to serve wheelchair patrons using major pedestrian routes, particular situations are occasionally identified where additional cuts are justified.

SELF OPERATING ELEVATORS - HANDICAPPED (15NG)

PROJECT DESCRIPTION:

This project will modify the elevator facilities at all BART passenger stations, to improve the ease and security of operation by the handicapped, especially wheelchair users.

PROJECT JUSTIFICATION:

The handicapped elevator usage survey of 1983 was the impetus for providing more customer control over station elevators. This would allow station elevator operation without station agent intervention.

TEXTURED PLATFORM EDGE III (15NH)

PROJECT DESCRIPTION:

This project is to install a platform edge detection system for the benefit of all passengers.

PROJECT JUSTIFICATION:

In an effort to reduce hazards associated with the platform edge, the District has tested and evaluated several types of platform edge detection systems. The selected system, an embossed, rubberized tile installation, will provide tactile (under-foot or cane) information, as well as audible (cane-tip) and color-contrast detection.

UNDERGROUND STORAGE TANK MONITORS (15SA)

PROJECT DESCRIPTION:

This project is necessary to bring the District in compliance with California Code changes which require tanks containing hazardous materials to be monitored for leaks.

PROJECT JUSTIFICATION:

The District owns 22 underground tanks, 13 of which have been exempted from the new regulations. Of the nine remaining tanks, one waste oil tank at Richmond Yard will be removed completely, four others will be removed and replaced with double-wall tanks, and four fuel tanks will remain in place and wells installed to allow continuous monitoring.

BART POLICE OFFICE MODS (17BR)

PROJECT DESCRIPTION:

Modify the police concourse level area to include relocation of existing holding cell and equipment cage, provide interview room, increase locker room size, relocate and add one shower, and provide new office and storage space.

PROJECT JUSTIFICATION:

This project allows more efficient use of space and improves BART Police operations.

LAKE MERRITT FIFTH FLOOR REFURBISHMENT (17BS)

PROJECT DESCRIPTION:

This proposal/contract is for the painting of walls, doors, cabinets and other selected areas, furnishing of accoustical panels and replacement of rubber and wood floor bases on the 5th floor of the Lake Merritt Administration Building.

PROJECT JUSTIFICATION:

The upgrade of the fifth floor is required to upgrade executive offices and conference room facilities.

REMODEL TELEPHONE CENTER (17BU)

PROJECT DESCRIPTION:

This project is to upgrade the transit information center including installation of work stations, purchase of new office equipment and relocate electrical circuits and telephone cables.

PROJECT JUSTIFICATION:

This upgrade creates for employees a more efficient and professional environment in which to work. Also, it provides break room amenities for those employees who work different shifts.

MAINTENANCE BUILDING MODS (17FD)

PROJECT DESCRIPTION:

This project is to modify the training area in the 4th Street building, provide for more efficient entrance, better sound insulation, improved air conditioning and other improvements.

PROJECT JUSTIFICATION:

These modifications are needed to improve the training environment in the building.

METRO CENTER MODIFICATIONS (17HF)

PROJECT DESCRIPTION:

This project is to expand office facilities at the MetroCenter.

PROJECT JUSTIFICATION:

As part of a substantial relocation of a number of employees at both the Lake Merritt Administration (LMA) Building and the MetroCenter, modifications must be made in the MetroCenter to accomplish the relocation of the AFC Maintenance Shop and to create a copy machine and supply room for Employee Relations. These changes all relate to the Ground Floor of the MetroCenter.

ELIMINATE STATION INTERFACES (20AC)

PROJECT DESCRIPTION:

This project will provide the necessary interstation cables and complete the other required modifications to the train control equipment to eliminate the headway constraints at 11 locations.

PROJECT JUSTIFICATION:

This modification will allow continuous "following move speed profiles" across the interface, thus reducing the minimum headways between trains at critical locations. The present train control system does not have sufficient numbers of vital interstation cables necessary to pass the individual track circuit occupancies.

TIMELOCKING MODS (20BF)

PROJECT DESCRIPTION:

Timelocking is a function of the Wayside Train Control Interlock System. The system assures that switches remain aligned during passage of trains through a switch area. This modification would replace current mechanical time locking relays with newer more reliable solid state relays. The newer relays would allow a change in the manner that the time locking function is invoked resulting in decreased delay for trains during busy periods.

PROJECT JUSTIFICATION:

This modification is necessary to allow closer headway operation under the Capacity Expansion Program.

OPTIMIZE SPEED PROFILES (20FD)

PROJECT DESCRIPTION:

As a result of the Close Headways Project completed in 1979, a number of locations on the system have speed profiles which are more restrictive than would be indicated by safety considerations. This project would systematically review all critical locations and provide modifications to the Wayside ATC that would reduce delays to the minimum required for safety.

PROJECT JUSTIFICATION:

This project will reduce passenger delays and increase throughput.

STATION BACKUP POWER (20HB)

PROJECT DESCRIPTION:

Purchase and install equipment and batteries to upgrade the essential power systems in train control rooms.

PROJECT JUSTIFICATION:

Certain BART train control and communications equipment is supplied by essential power systems. These systems provide uninterruptible power during station power outages and isolate the supplied equipment from utility power system transient disturbances. Currently, uninterruptible power systems (UPS) furnish this essential power.

The original installations are now loaded to a point that certain critical equipment is not supplied by uninterruptible power systems. New projects such as ICS, Cable Plant and RADCOM are complete or underway. Some functions which are presently supplied by essential power will be replaced, but total demand will be significantly greater than the existing essential power capacity. Providing additional essential power would improve availability of voice and data communications between central control and field locations. Thus, during periods of loss of power from the local utility, train delays would be minimized.

The scope of this project is to provide for design, furnishing, and installation of equipment and batteries to upgrade the essential power systems in the train control rooms of 31 stations, 3 yards, 3 ventilation structures and 1 portal structure for new and existing systems. The work will be implemented by a furnish and install, competitively bid, contract and cutover assistance by BART maintenance forces.

Upon completion of this project, existing essential power supply equipment would be replaced at all 38 locations with new static-type uninterruptible power supply equipment similar to the existing equipment, but of a larger capacity and existing battery capacities at all locations would be upgraded and increased in size to one and one-half hour capacity.

Essential power upgrade must be completed before the ICS is used to control revenue operation.

YARD EFFICIENCY MODIFICATIONS (21EB&)

PROJECT DESCRIPTION:

Complete installation of Automatic Car Identification (ACI) system in the Concord, Richmond, and Hayward yards.

PROJECT JUSTIFICATION:

The ACI scanning systems and associated hardware/software at BART identify and automatically record the location of individual BART cars throughout the BART system. This project pertains to the incomplete yard portions of the scanning systems.

Subsequent to the installation of the original ACI systems, BART extended some storage tracks and added others in the three storage yards. Cars entering or stored in these added areas are "lost" to the scanning system and consequently not automatically recorded. The current procedure requires otherwise busy personnel to manually track and record the location of cars on the added or extended tracks. This project will permit the installation of additional ACI systems in the yard areas where needed.

Manual input of car locations can lead to errors during busy times such as morning and evening layups; afternoon buildups; replacement of bad order trains; and repaired cars that are moved from the revenue vehicle shop area to storage tracks. Such manual procedures can interfere with mainline operations by distracting tower operators. Errors have allowed bad-order cars to be dispatched. Then the train must be removed causing a missed dispatch and sometimes an off-load.

RADCOM (270B&)

PROJECT DESCRIPTION:

This multi-phase, multi-year project improves radio communications between BART Central and BART trains. In addition there are provisions for improved emergency communications.

PROJECT JUSTIFICATION:

The project would allow better communications overall and especially during emergency situations.

INSTALL SIXTH CAPACITOR & MODIFY OLR (41BU)

PROJECT DESCRIPTION:

This project adds a sixth capacitor to the propulsion system and changes the response time of the traction motor overload relay (OLR) in order to reduce the number of traction motor overloads.

PROJECT JUSTIFICATION:

The transit vehicle propulsion system continues to have a high number of overload failures which result in flashed traction motors, failed T-1 thyristors, blown main fuses and blown shoe fuses (with resultant motor alternator failures). These failures can disrupt mainline operation when smoke is generated from the overload, impact the shop work load and stress other propulsion system equipment.

MULTI-DENOMINATIONAL BILL VALIDATORS (45AN)

PROJECT DESCRIPTION:

The "Multi-Denomination Bill Validators" project is intended to replace the $1 and $5 validators presently installed in ticket vendors with units that will accept $1, $5, $10 and $20 denominations.

PROJECT JUSTIFICATION:

Reduction in bill handling will reduce maintenance and failures of bill validators and will provide labor savings. Patron complaints of not being able to use higher denomination bills will be eliminated.

IBM TICKET TRANSPORT RETROFIT (45BF)

PROJECT DESCRIPTION:

This project is to retrofit ticket vending machines, addfare machines and fare gates with updated components.

PROJECT JUSTIFICATION:

IBM fare machines in some locations have been operating continually for over 10 years.

Examination of the ticket handling mechanism (THM) of two fare gates and one ticket vendor reveals that 60-90% of the moving components are sufficiently defective to require replacement with updated components.

MUNI FAST PASS ANTI-FRAUD (45BK)

PROJECT DESCRIPTION:

This project provides modifications to prevent fare evasion through fraudulent use of the MUNI Fast Pass.

PROJECT JUSTIFICATION:

As a result of this project the District will not lose any additional revenue.

AC/BART FAST PASS CUBIC GATE MODS (45CK)

PROJECT DESCRIPTION:

Project provides modifications to the BART Cubic Fare Gates to allow use of the AC/BART Fast Pass.

PROJECT JUSTIFICATION:

This work is required for AC/BART pass coordination.

9 VENDORS AND 8 ADD FARES (47BA)

PROJECT DESCRIPTION:

This project will allow the purchase and installation of BART ticket vendors and add fares at various stations.

PROJECT JUSTIFICATION:

This fare collection equipment will support the Daly City Intermodal project and increase fare vending capacity at other stations.

PLATFORM TRAIN SCHEDULE SIGNS (59CK)

PROJECT DESCRIPTION:

The "Platform Train Schedule Signs" project is to provide train schedule information for patrons at the platform level.

PROJECT JUSTIFICATION:

This project has been undertaken at the request of BART riders. Installation of train schedule information at station platforms is expected to minimize passenger confusion.

COMMUNICATIONS & COMPONENT REPAIR AFC RELIABILITY REPORTING (65NB)

PROJECT DESCRIPTION:

This project involves installing input terminals in station agent booths to transmit automatic fare collection (AFC) failure incidents and repairs to a mini computer located at the Lake Merritt reporting location.

PROJECT JUSTIFICATION:

The problems in AFC incident reporting arise from the failure of the current telephone taping system to provide an accurate and timely on-line status report. These problems include technical problems with the tape recorders and telephone lines between Hayward Shop and the Stations; unreported incidents and repairs; and incorrect or unclear information on the tapes.

REPLACE MAINTENANCE/SERVICE VEHICLES & EQUIPMENT (79-- & 79B-)

PROJECT DESCRIPTION:

This project is to procure replacement maintenance/service vehicles and equipment.

PROJECT JUSTIFICATION:

1. Maintenance/Service Vehicles
2. Maintenance Equipment

Properly operating maintenance/service vehicles and equipment assist BART in providing safe, comfortable, reliable and efficient service.

BART's maintenance equipment gradually becomes worn from age and usage. Eventually it becomes more economical to replace the old equipment rather than repair it. The ongoing equipment replacement program assures that old, worn-out equipment is replaced in a timely manner to minimize overall costs and ensure personnel safety. If this equipment is not replaced, overall costs will increase and maintenance crews will be disrupted by failed equipment.

This maintenance equipment includes such items as electric and pneumatic grinders and hand tools, portable light and power generator sets, light towers, air compressors, electric carts for transporting personnel and material, commercial lawnmowers, ground maintenance equipment, vacuums, floor scrubbers, polishers and various floor maintenance equipment; shop equipment such as jacks, jack stands, saws, drills, engine test equipment, electric and electronic meters, gauges, test instruments and equipment.

BART has a fleet of light-duty highway vehicles to transport personnel and necessary equipment to work sites in the District. In addition, BART police and District personnel use sedans for regular duties. These vehicles are selected for replacement according to a consistent procedure developed by BART staff. Generally, the policy requires that sedans and pickups must be replaced after 70,000 miles and vans and police cars after 90,000 miles. At current usage rates, an average of 40 light-duty vehicles must be replaced each year. On the average, this is equivalent to replacing each vehicle every five years.

However, heavily used vehicles are replaced more often while lightly used vehicles are replaced less often.

Heavy-duty maintenance vehicles also need periodic replacement. Maintenance personnel use these vehicles, which include diesel trucks, tractors, and track-maintenance vehicles, to repair and maintain BART's physical plant and to respond to emergencies. These vehicles' costs and useful lives vary widely.

Annual replacement needs and costs vary accordingly. The ongoing vehicle replacement program assures that all support vehicles are replaced in a cost-effective manner. Without this program, continued use of overage vehicles would increase maintenance and other costs, as well as safety-hazards to personnel.

NEW SAFETY EQUIPMENT (79KF)

PROJECT DESCRIPTION:

This project is to replace Draeger breathing apparatus previously supplied by BART to four fire departments.

PROJECT JUSTIFICATION:

In 1979 following the Transbay Tube train fire, the District supplied the San Francisco, Oakland, Berkeley and Orinda Fire Departments with 4-hour Draeger breathing apparatus units. The agreement with the fire departments was that BART would maintain and/or replace the Draeger equipment. The fire departments have recommended that the Draegers be replaced on a one-for-one basis with equipment similar to that already in use by the fire departments. The fire departments have also proposed that if the District accepts the above recommendation, BART will no longer be responsible for the future maintenance and replacement of the breathing equipment.

PORTABLE RADIOS (79LC)

PROJECT DESCRIPTION:

This project is for the acquisition of 14 portable radios to be used by train operators.

PROJECT JUSTIFICATION:

Each train operator on duty is assigned a portable radio in order to move cars in the yard and as backup communication in case of emergency when operating on mainline. This acquisition is due to the increased number of train operators as well as the normal replacement requirements.

RAIL GRINDER (79MP)

PROJECT DESCRIPTION:

This project provides for the acquisition of one rail grinder.

PROJECT JUSTIFICATION:

The replacement rail grinder will retire the present, nearly worn out vehicle and also provide added rail grinding capability to support 51 train service beginning September 1988. Rail grinding is a very important facet of the maintenance program as it ensures lessening wheel impact on the revenue car due to rail corrugation as well as providing patrons with a smooth, quiet ride.

INVENTORY BUILDUP (93DP)

PROJECT DESCRIPTION:

This project is to purchase inventory which is needed to sustain revenue service.

PROJECT JUSTIFICATION:

This work is necessary for continued adequate on-hand inventory.

SYSTEM SAFETY UPGRADE (99*15)

PROJECT DESCRIPTION:

This project includes any further major wayside improvements that may be ordered by the CPUC as a result of their Investigation OII 85-02-007. These projects may include Gage-Babcock Associates (GBA) recommendations previously rejected by BART staff or additional recommendations of the CPUC staff or Fire Department Liaison Committee.

PROJECT JUSTIFICATION:

In 1980, BART retained (GBA) to study existing emergency wayside facilities. The District is in the process of implementing a number of these projects individually identified in the Project Status Report. In February 1985, the State Public Utilities Commission instituted OII 85-02-007, one aspect of which is to determine if BART should be ordered to implement additional wayside modifications. As a result of their investigation, the Commission could order BART to proceed with some additional modifications. The cost may exceed $5,000,000 depending on the action of the CPUC.

LAND AND LAND RIGHTS (99*50)

PROJECT DESCRIPTION:

This project allows completion of basic system real estate transactions.

PROJECT JUSTIFICATION:

There are continuing miscellaneous costs associated with purchases of the original right-of-way.

AGENCY AND UTILITY AGREEMENTS (99*51)

PROJECT DESCRIPTION:

This activity represents payments due, when billed, for completion of basic system utility relocations, street closures, street restorations, drainage, etc., accomplished by various governmental agencies and utilities.

PROJECT JUSTIFICATION:

During initial system construction a number of utilities, streets, etc., needed to be relocated. In most cases BART paid governments and utilities to accomplish the work. Some of the work has not been billed to date.

OTHER COSTS (INSURANCE, BOND AGENTS, ETC.) (99*52)

PROJECT DESCRIPTION:

This activity covers costs associated with completion of the basic system including insurance, bond agent costs associated with the initial bond issue, contracts administration, etc.

PROJECT JUSTIFICATION:

Work is needed to continue meeting obligations made during initial system construction.

OUTSTANDING CLAIMS (99*54)

PROJECT DESCRIPTION:

This item represents a reserve against outstanding and potential claims arising out of the basic system construction.

PROJECT JUSTIFICATION:

This reserve is needed to meet potential obligations.

PROJECT DEVELOPMENT (99*55)

PROJECT DESCRIPTION:

This project covers costs associated with preliminary engineering and design necessary to bring projects to a stage of readiness where a grant application can be submitted. It also covers preliminary work on some BART funded projects.

PROJECT JUSTIFICATION:

For a project to be fully considered by UMTA or MTC for funding it must be "well defined". These costs cover work necessary to meet that requirement.

PLANNING & STATION AREA DEVELOPMENT (99*56)

PROJECT DESCRIPTION:

This is ongoing planning work associated with extensions, access, and joint development efforts.

PROJECT JUSTIFICATION:

Planning is needed to meet future capacity/operational requirements needs as well as to capture income potential associated with BART property around stations.

STATION AREA DEVELOPMENT INFRASTRUCTURE IMPROVEMENTS (99*59)

PROJECT DESCRIPTION:

These are costs associated with street, utilities, and other improvements needed to support joint development projects.

PROJECT JUSTIFICATION:

In order to achieve the greatest return on BART joint development projects, it is necessary to provide improvements to local facilities around BART stations.

IMPROVEMENT ALLOWANCE (99*66)

PROJECT DESCRIPTION:

This project represents miscellaneous work including capitalized maintenance projects, minor modifications to facilities, and urgent capital projects for which the five year lead on MTC programming is not acceptable.

PROJECT JUSTIFICATION:

These projects are necessary for maintaining the integrity of the basic operation.

ENTRANCE CANOPIES (99*84)

PROJECT DESCRIPTION:

This project is to provide protection for exterior station escalators.

PROJECT JUSTIFICATION:

The District is currently in the process of repairing and rehabilitating station escalators. In order to minimize failures and prolong the useful life of exterior escalators, the construction of canopies will provide protection against constant exposure to the elements.

DALY CITY
BART

CAPACITY EXPANSION PROJECTS

General

Provision for full capacity is a major focus of District efforts. The most recent capacity addition occurred in November, 1986 with the addition of 2 peak period trains, bringing total on-line trains to 45. The last major capacity expansion prior to 1986 resulted from the Close Headways Program implemented during the summer of 1980. This added a fourth Transbay route running between Richmond and Daly City. That improvement increased peak period on-line trains from 33 to 42, and on-line cars from 272 to 310. While scheduled peak hour Transbay capacity is 55% greater today, the growth in demand since 1980 has nearly used up this increase in capacity. Constrained ridership levels are clearly part of BART's future unless capacity can be expanded yet again. The following projects are all designed to expand BART capacity such that the ultimate goal of 2 minute 15 second headways can be achieved.

Figure 2 lists the current capacity expansion projects and shows the funding status of each one. Following this figure is a description, justification and status for each project.

PHOTOGRAPH: C-CAR AT DALY CITY STATION PLATFORM STATION

THE NEW C-CARS CURRENTLY ON ORDER ARE A MAJOR COMPONENT OF THE CAPACITY EXPANSION PROGRAM.

Figure 2
CAPACITY EXPANSION PROJECTS

$ 000

FMS #	PROJECTS	FUNDED	UNFUNDED	TOTAL
01SP	C-CAR MANAGEMENT TEAM OFFICES	$56	$0	$56
11--	DALY CITY TURNBACK	$141,300	$0	$141,300
11TD	DALY CITY SHOP	$3,058	$4,854	$7,912
15EG	ELECTRICAL CAPACITY IMPROVEMENTS	$7,790	$0	$7,790
20--	WAYSIDE TRAIN CONTROL & SYSTEM PERF. MODS	$14,929	$0	$14,929
41GB	2D GENERATION ATO/138 A-CAR SETS	$13,800	$0	$13,800
42AA	150 NEW TRANSIT VEHICLES & ATO	$228,298	$0	$228,298
61--	INTEGRATED CONTROL SYSTEM - ICS	$36,240	$0	$36,240
(79AC & 79AD)	NEW MAINTENANCE VANS & PICKUPS	$85	$0	$85
79DA	NEW MAINTENANCE HIGH RAILERS	$307	$0	$307
99*73	C-CAR START-UP	$2,000	$0	$2,000
99*75	SYSTEM PERFORMANCE STUDY JUSTIFIED PROJECTS	$14,000	$0	$14,000
99*77	DALY CITY TURNBACK OVERRUN RESERVE	$8,000	$0	$8,000
99*80	SYSTEM PERFORMANCE STUDY PROJECTS-PHASE II	$4,000	$0	$4,000
	TOTAL	$473,863	$4,854	$478,717

C-CAR MANAGEMENT TEAM OFFICES (01SP)

PROJECT DESCRIPTION:

The purpose of this project is to relocate the C-Car management team to Hayward Yard which is the delivery site for the C-Car.

PROJECT JUSTIFICATION:

The delivery phase of the C-Car project is scheduled for October 1987. Management of this phase of the project can be more effectively carried out at Hayward Yard.

DALY CITY TURNBACK, YARD AND SHOP (11--, 11TD)

PROJECT DESCRIPTION:

Construct a turnback, yard and shop at Daly City to allow quicker train reversing and storage so as to provide capability for higher density train operations and lower costs.

PROJECT JUSTIFICATION/STATUS:

Higher density train operations will require a more efficient and less time consuming train reversing facility at Daly City. An interim measure already completed permits the reduction of the minimum scheduled headway to 3 minutes through train control modifications in the vicinity of Daly City Station.

A West Bay storage facility will be needed to lay up vehicles not needed for midday operations. Layups at this yard will produce significant savings in power and vehicle maintenance costs. Shop facilities would provide essential support to the new yard and in maintaining lower headways. (The Shop Facilities project is a separate project which will cost $7.9 million, of which 39% is currently funded.)

The Civil/Structural contract for the Turnback is complete and the track installation is progressing. Special trackwork, running rail and insulators have been received. The remaining procured material was received in July 1987 except for essential power backup batteries. At the Daly City Station the pedestrian bridge has been installed and train control rooms modified. For the yard, the 60-inch water line has been relocated, streets realigned, and excavation is now in progress. All contracts will be advertised by September 1987. Final design is 100% complete.

M-87 INTERLOCKING (PART OF 11--)

PROJECT DESCRIPTION:

Reconfigure M-87 interlocking in the vicinity of Daly City.

PROJECT JUSTIFICATION/STATUS:

As presently configured, the M-87 interlocking (which provides safe routing of trains in the vicinity of Daly City Station where the tracks cross over each other) creates interference between inbound and outbound trains. Reconfiguring the M-87 interlocking will increase operational flexibility in the vicinity of the Daly City Turnback.

Preliminary Design Review is complete and detailed subsystem design is progressing.

ELECTRICAL CAPACITY INCREASE (15EG)

PROJECT DESCRIPTION:

Increase power distribution on the C-line and in all three East Bay yards.

PROJECT JUSTIFICATION/STATUS:

Operation of additional peak period trains at reduced headways will require additional power distribution facilities on the C-line and in all three East Bay yards. Improvements planned involve the installation of 2 new substations, modification and upgrade of existing yard substations, third rail modifications and increase of yard feeder cable capacity.

The third rail upgrade contract is in progress. Installation demonstration was successful and mainline work has started. Bids for the substation equipment were received and rejected. Bids were received for the yard feeder installation contract, award authorization was granted by the BART Board in December 1986, and the contract was signed in February 1987. The substation equipment installation contract is on hold until the equipment is in production.

WAYSIDE TRAIN CONTROL/SYSTEM PERFORMANCE MODIFICATIONS (20--)

PROJECT DESCRIPTION:

Implement Wayside Train Control improvements and System Performance Modifications as described below.

PROJECT JUSTIFICATION/STATUS:

The System Performance Study determined that a number of improvements will be necessary, in addition to the projects described above, to achieve BART's capacity expansion objectives while maintaining or enhancing service quality. The improvements necessary include the following key tasks:

- Reconfiguration of track circuits by moving and adding blocks to minimize headways and to match Sequential Occupancy Release System (SORS) requirements
- Resignalling of some parts of the system (mostly the San Francisco M-line)

- Installation of station approach markers
- Modification of SORS software to reduce time to initialize (reset) the system and to match track modifications
- Optimization of speed codes systemwide
- Development and implementation of a delay reduction program
- Development of the simulator to include the delay model
- Modification of the Brake Rate Algorithm

The wayside and station multiplex box simulators for the reconfiguration project are in the design and fabrication stage. The design work is continuing and the contract documents are being prepared. The simulator project continues with the development work for ICS testing and refinement of C-car scheduling to accommodate desired train sizing.

NEW ON-BOARD ATC (41GB)

PROJECT DESCRIPTION:

Replace existing Automatic Train Control (ATC) units on all A-cars.

PROJECT JUSTIFICATION/STATUS:

The existing ATC units on all A-cars represent the largest single cause of vehicle service disrupting failures on the system. The New On-Board ATC will substantially reduce ATC hardware failures and, through the use of redundancy, will reduce ATC-caused service disrupting failures by a factor of 25 to 1.

These units will be installed in all new C-cars and will be retrofitted into existing A-cars.

C-CARS (42AA&)

PROJECT DESCRIPTION:

Procure 150 new C-cars.

PROJECT JUSTIFICATION/STATUS:

One hundred fifty new revenue vehicles are needed to service anticipated patronage growth. The new C-cars will permit expansion of existing trains which are less than 10 cars long, addition of new trains on the system (after headways are reduced), and efficient on-line sizing of trains.

The first four prototype cars were delivered in October 1985. Testing of the prototype cars was completed April 30, 1987. Various problems have been found and are being corrected, including the auxiliary power supply equipment. Most of the Production Baseline Design Reviews have been completed. These reviews are necessary before final production of vehicles can occur. First Article Configuration Identification (FACI), to ensure that configuration of the production equipment is in accordance with approved drawings, is continuing. FACI is a necessary quality assurance step required before the vehicles are delivered. Delivery of production cars is expected to start in October 1987 with revenue operation beginning in January 1988. The cars are being built by Soferval, Inc. of France. Final assembly is being done in the Soferval plant in Union City, California.

INTEGRATED CONTROL SYSTEM - ICS (61--)

PROJECT DESCRIPTION:

Implement new central train computer, in conjunction with various supporting wayside equipment, to provide capability of operating above the current 49 train limit.

PROJECT JUSTIFICATION/STATUS:

The central train computer, in conjunction with various supporting wayside equipment, provides systemwide train supervision. The existing central computer is capable of monitoring the movement of up to 49 trains at any one time. Expansion of the central control capabilities is needed to allow for on-line train operations exceeding the current 49 train limit. The Integrated Control System (ICS) will allow BART to operate 75 on-line trains initially, with the capability of expanding the control system for operating 115 trains.

Stage II was completed in late 1986. On the basis of maintainability, system simplification, reliability, and cost, the system's configuration was changed. This change was effective in eliminating the station processors (PIO's).

Stage III was completed on March 31, 1987 and resulted in a detailed project plan and schedule for the remainder of the project.

The remainder of the project is composed of 4 more stages, each approximately 6 months in duration. Estimated completion date for the project is October 1989.

NEW MAINTENANCE VANS & PICKUPS (79AC & 79AD)

PROJECT DESCRIPTION:

This project is to procure new vans, pickups, and hi-rail vehicles through FY 87/88.

PROJECT JUSTIFICATION:

In preparation for service increments to be allowed by the Capacity Expansion Program, BART will need to increase the size of the service vehicle support fleet. This project will purchase maintenance and service vehicles in anticipation of the increased maintenance resulting from increased service.

NEW MAINTENANCE/SERVICE VEHICLES - NEW HI-RAILERS 86/87 (79DA)

PROJECT DESCRIPTION:

Procure one fully-equipped hi-rail crew truck, one tunnel truck to support the tamper/liner crew and grout torquing operations and a high rail vehicle to support maintenance of electrical systems in meeting the increased maintenance demands of the Capacity Expansion Program.

PROJECT JUSTIFICATION:

The increase in BART service, resulting in additional transit vehicles and additional trains running at closer headways will have an impact on present track structure maintenance programs and repair. To insure that the level of maintenance exceeds the Federal Railway Administration requirements, the track maintenance cycles relating to surfacing, lining and tamping have to be modified, calling for additional manpower and equipment.

Passenger comfort and safety are related to adequate maintenance of trackbeds, structures and electrical systems. Inadequate maintenance of the trackbed will adversely affect the way rail wears. This could increase rail grinding requirements and ultimately shorten the life of the rail. As the rail wears, a rougher ride results and the risk of derailments increase.

In addition to passenger comfort, if track and structures are not maintained properly, they can deteriorate to the place where the only alternative is complete replacement. Beyond this long term inefficiency resulting from inadequate maintenance, higher frequency revenue service will mean a shorter time period during which track and structures can be maintained. This is because there are likely to be increased requirements for yard moves and other activities after revenue hours. The addition of this equipment will allow improved crew scheduling and a more efficient operation over what would otherwise be possible.

The project involves purchase of a hi-rail crew truck, complete with crewcab, to transport personnel, 120 CFM air compressor, 10KW generator set and tool and equipment storage compartments ($80,000).

The increase in service as stated above holds true for structure maintenance as related to the transbay tube, tunnels, and all underground track areas. The frequency of maintenance related to water control, washing, corrosion, bolt torquing, and caulking the steel-liner plates will have to be modified.

To meet these goals an additional hi-rail truck, especially designed for tunnel maintenance will be required. This unit will be complete with an elevating work platform, 120 CFM air compressor, 10KW generator set and crew cab for transporting personnel ($152,000).

The increase in BART service, resulting in additional transit vehicles and additional trains running at closer headways will have an impact on present electrical power system maintenance. The recent addition of the KE Track, the present expansion at Daly City and the electrification upgrade on the "C" Line, all result in additional equipment, i.e., electrical substations, gap breaker station, third rail and third rail coverboard that requires cycled maintenance and repairs.

To meet District maintenance goals, additional manpower and equipment will be required. A third hi-rail truck complete with elevated platform and service body for transporting specialized tools and materials will be essential ($75,000).

C-CAR START-UP (99*73)

PROJECT DESCRIPTION:

Training and other miscellaneous costs associated with placing the new C-Cars in service.

PROJECT JUSTIFICATION:

A number of activities of an administrative and training nature are anticipated to be required prior to placing all C-Cars in service. This project would cover all or part of those costs.

SYSTEM PERFORMANCE STUDY JUSTIFIED PROJECTS - PH I (99*75)

PROJECT DESCRIPTION:

Miscellaneous modifications to the train control system to bring the system up to the full potential identified as possibly achievable in the System Performance Study.

PROJECT JUSTIFICATION:

When BART was seeking funding of the System Performance Study modifications (Wayside Train Control SPS Justified Mods), UMTA expressed reluctance to fund a part of the work called "Delay Reduction". BART subsequently agreed with the TOCC to fund these tasks from BART sources. This project covers these costs.

DC TURNBACK OVERRUN RESERVE (99*77)

PROJECT DESCRIPTION:

This item is a reserve to cover potential costs associated with the Daly City Turnback and Yard.

PROJECT JUSTIFICATION:

Not all costs for real estate and overruns identified as Local Activity in the Full Funding Grant Agreement are covered by grant funds. This project would cover those costs.

SYSTEM PERFORMANCE PH-II (99*80)

PROJECT DESCRIPTION:

Additional work related to ICS which is not covered by the existing grant.

PROJECT JUSTIFICATION:

Some of the work on ICS will not be covered by current grants.

bart PARKING

STATION ACCESS PROJECTS

General

A key element for the success of the Capacity Expansion Program is improved station access. The following discussion covers major issues affecting access. Also included are tables listing all of BART's access projects, together with cost and funding status information. This section also includes a description and justification for each project.

Requirements

BART access goals call for parking improvements along with numerous transit-interface enhancements, including express and feeder bus improvements, transfer coordination, and elderly/handicapped access improvements. Each of the station access projects contain components which address these goals and contribute to the efficiency and convenience of intermodal transfer facilities.

AC Transit is planning a major restructuring of routes which will have the effect of bringing many more buses to BART stations for simultaneous loading and unloading of passengers. Station transfer facilities are currently inadequate to meet these increased needs. CCCTA likewise anticipates a need for improved transfer facilities in the future.

Transit coordination improvements included in several of the station access projects include sheltered walkways and waiting areas for bus transfers; improved signage and transit information; adequate bus bays for increased numbers of simultaneous off-loadings and boardings; and fast, safe station area circulation for these buses. These projects will provide more convenient and attractive service for existing and future BART/bus patrons.

Most BART stations have exceeded their parking lot capacities for many years. The parking spillover onto local streets has caused a secondary problem which has led to restricted street parking programs in many communities surrounding BART stations. In addition to the patron inconvenience and community impact caused by parking shortages, loss of potential revenue is a major problem caused by this situation.

All of the parking-deficient stations experience significant revenue loss due to accessibility constraints. BART estimates that the current systemwide shortage of parking to meet latent demand is 12,500 spaces. The consequent net revenue loss due to inaccessibility is currently estimated at $10 million per year. Revenue loss potential will become even more serious after completion of the Capacity Expansion Program, when additional rail capacity will become available during peak as well as off-peak periods.

PHOTOGRAPH: PARKING STRUCTURE & BUS TRANSFER FACILITIES AT DALY CITY STATION

THESE ACCESS ENHANCEMENTS AT DALY CITY STATION ARE SIMILAR IN CONCEPT TO PROJECTS PLANNED FOR OTHER BART STATIONS

Additional parking will be necessary to optimize rail-revenue and patronage efficiency even if the access mode shares supplied by bus transit and carpools remain constant or even increase. BART anticipates substantially higher numbers of patrons arriving at stations by all modes, including autos, in future years. In the past year, BART received important constituent input through surveys and opinion polls indicating very high demand for additional parking (see Figure 3).

BART anticipates that most of the autos attracted to new parking will be drawn from regional commuters now utilizing freeways and other congested arteries for their entire commute, and not from current BART patrons now using buses or other access modes. These parking projects would remove a portion of such regional commuter trips from freeways and congested arterials.

Figure 4 is a summary of the critical access characteristics of each of the stations programmed for access improvements.

Each project contains a significant replacement and rehabilitation element. The proposed projects will replace existing bus-interface facilities and patron parking on neighborhood streets. Where possible, BART will coordinate construction of parking facilities and transit improvements with the need to maintain, repair, and rehabilitate existing access facilities.

Program Cost and Funding Status

The total cost of the BART station access program is $194.5 million. A summary of the funding status of the program is shown in Figure 5.

The station access program is partially funded with the proceeds of the 1985 Sales Tax Revenue Bond Issue for a total of $42.6 million. Several of the projects that are funded from the "Bond List" are surface parking lots at existing rail stations and park/ride lots on possible future BART station sites. In addition, three parking structures are funded, at Concord, Oakland West and Pleasant Hill Stations. Some parking projects on the "Bond List" are programmed with a combination of bond, state and federal funds.

The $137.1 million unfunded station access program comprises eleven station access improvement projects. Five of these projects have been included in BART's current MTC capital priorities submission for possible funding in FY 1991/92.

Figure 3

Contra Costa County Opinion Poll

Survey Question: "Need to provide additional parking at the existing BART stations."

County Area	Percent who Favor
West County	60%
Lamorinda	68%
South County	82%
East County	60%
Central County	78%

Source: Contra Costa Sales Tax Study Public Opinion Poll results account for registered voters in the County of Contra Costa, April 1986.

Bay Area Council Survey

In the fall of 1986, the Bay Area Council staff conducted a telephone survey of 31 large Bay Area employers. Twelve of these employers identified increased BART parking as the public infrastructure investment that would most improve transportation for their respective companies and employees.

Figure 4

SUMMARY OF BART STATION ACCESS PROGRAM

STATION	BART FMS#	ADDITIONAL PARKING SPACES	FACILITY COST (Millions)	ANNUAL LOST REVENUE	NEIGHBORHOOD PARKING INTRUSION	CURRENT PARKING SHORTAGE
Lake Merritt	(01EE)	400	$ 6.5	$ 198,000	100 vehicles	285 spaces
Fruitvale	(01GH)	560	$10.6	$ 472,000	150 vehicles	650 spaces
BayFair	(01MH)	600	$10.8	$ 512,000	50 vehicles	640 spaces
Hayward	(010F)	300	$ 2.6	$ 415,000	250 vehicles	515 spaces
Union City	(01VG)	300	$ 4.0	$ 465,000	260 vehicles	445 spaces
Rockridge	(03E-)	500	$ 4.0	$ 159,000	300 vehicles	350 spaces
Orinda	(03HG)	500	$ 9.0	$ 324,000	50 vehicles	380 spaces
Lafayette	(03JE/JG)	1,020	$11.4	$ 427,000	100 vehicles	440 spaces
Walnut Creek	(03LG)	1,120	$14.3	$ 868,000	325 vehicles	855 spaces
Pleasant Hill	(03NE)	1,200	$18.3	$1,776,000	350 vehicles	1,600 spaces
Concord	(03S-/SH)	1,150	$24.8	$2,030,000	370 vehicles	1,750 spaces
North Berkeley	(05GB)	145	$ .2	$ 112,000	90 vehicles	150 spaces
El Cerrito del Norte	(05KD/KH)	1,340	$14.6	$ 644,000	400 vehicles	820 spaces
MacArthur	(07GH)	640	$12.1	$ 334,000	125 vehicles	470 spaces
Oakland West	(11EH)	1,100	$24.2	$ 669,000	800 vehicles	970 spaces

Figure 5

STATION ACCESS PROJECTS
$000

FMS#	PROJECTS		FUNDED	UNFUNDED		TOTAL
				PROGRAMED SECTION 9	SOURCE UNKNOWN	
0--&	PARKING PRODUCTIVITY IMPROVEMENTS		$4,873	$0	$0	$4,873
01EE	LAKE MERRITT STATION ACCESS IMPVTS	(Note 1)	$0	$5,000	$1,485	$6,485
01GG	ALAMEDA PARK/RIDE		$429	$0	$0	$429
01GH	FRUITVALE STATION ACCESS IMPROVEMENTS	(Note 2)	$0	$5,000	$5,582	$10,582
01MH	BAYFAIR STATION ACCESS IMPROVEMENTS	(Note 1)	$0	$3,000	$7,809	$10,809
01OF	HAYWARD SURFACE LOT EXPANSION		$2,574	$0	$0	$2,574
01VG	UNION CITY SURFACE LOT EXPANSION		$4,073	$0	$0	$4,073
03E-	ROCKRIDGE STATION ACCESS IMPROVEMENTS		$0	$0	$4,000	$4,000
03HG	ORINDA STATION ACCESS IMPROVEMENTS		$0	$0	$9,023	$9,023
03JE	LAFAYETTE SURFACE LOT EXPANSION		$771	$0	$0	$771
03JG	LAFAYETTE STATION ACCESS IMPROVEMENTS	(Note 1)	$0	$5,000	$5,654	$10,654
03LG	WALNUT CREEK STATION ACCESS IMPVTS	(Note 2)	$0	$5,000	$9,305	$14,305
03NE	PLEASANT HILL PARKING FACILITY- EXPAND		$18,372	$0	$0	$18,372
03NG	PLEASANT HILL PARKING FACILITY- REPLACE.		$0	$0	$20,553	$20,553
03S-	CONCORD RPL. PKG. & ADDITIONAL CAPACITY		$11,000	$0	$0	$11,000
03SH	CONCORD STATION ACCESS IMPROVEMENTS	(Note 2)	$0	$5,000	$8,808	$13,808
03SJ	CONCORD INTERIM REPLACEMENT PARKING		$528	$0	$0	$528
04RA	BRENTWOOD PARK/RIDE		$290	$0	$0	$290
05GB	NORTH BERKELEY SURFACE LOT EXPANSION		$244	$0	$0	$244
05KD	E.C. DEL NORTE SURFACE LOT EXPANSION		$2,121	$0	$0	$2,121
05KH	E.C. DEL NORTE STATION ACCESS IMPVTS	(Note 2)	$0	$5,000	$7,532	$12,532
05MD	RICHMOND LOT COMPLETION		$100	$0	$0	$100
07GH	MACARTHUR STATION ACCESS IMPROVEMENTS	(Note 1)	$0	$5,000	$7,140	$12,140
11ED	OAKLAND WEST SURFACE LOT EXPANSION		$89	$0	$0	$89
11EH	OAKLAND WEST ACCESS IMPVTS PH. I	(Note 2)	$0	$5,000	$7,177	$12,177
11E-	OAKLAND WEST STATION FACILITY PH. II		$12,000	$0	$0	$12,000
		SUBTOTAL		$43,000	$94,068	
		TOTAL	$57,464		$137,068	$194,532

Note 1
Programmed for FY90/91

Note 2
Programmed for FY91/92

PARKING LOT PRODUCTIVITY IMPROVEMENT PROJECT (0--&)

PROJECT DESCRIPTION:

This continuing program provides increased parking capacity at various stations through redesign of existing BART-owned surface parking, to increase the capacity of various lots by 10 to 25 percent.

PROJECT JUSTIFICATION:

Parking lots will be restriped with narrower and shorter stalls, reduced access lane width, and reduced interior landscaping. The existing lots at the following stations are planned for redesign, resulting in approximately 2,120 new parking spaces: Fruitvale, Coliseum, San Leandro, Hayward, Fremont, Rockridge, Orinda, Lafayette, Walnut Creek, Ashby, North Berkeley, El Cerrito Plaza, and Richmond (The lots at Bayfair, South Hayward, Union City, Pleasant Hill, Concord, El Cerrito del Norte, and MacArthur Stations have already been reconstructed).

LAKE MERRITT STATION ACCESS IMPROVEMENTS (01EE)

PROJECT DESCRIPTION:

This project provides bus transit interface improvements and approximately 500 parking spaces (including about 100 site replacement spaces) in a multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

All 190 BART parking spaces at Lake Merritt Station are filled daily, limiting midday station accessibility when rail capacity is available. Net annual revenue loss due to this inaccessibility is currently $198,000 at this station. The potential for loss of revenue will increase upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods.

Over 100 patron cars currently park on nearby streets, displacing parking for local residents and businesses. The latent demand patron parking shortage is currently estimated to be 285 spaces.

FRUITVALE STATION ACCESS IMPROVEMENTS (01GH)

PROJECT DESCRIPTION:

This project provides bus transit interface improvements and approximately 860 parking spaces (including about 300 site replacement spaces) in a multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

Improved BART system access is in support of the Capacity Expansion Program. Developing adequate station access facilities will be essential to maximize the productivity of that Program.

Bus service at the Fruitvale Station currently consists of five AC Transit routes. Preliminary discussions with AC Transit indicate that this station may become a transit center allowing for timed transfers and a need to accommodate approximately twelve buses simultaneously. This program concept is consistent with the proposed project design.

Transit coordination improvements will include sheltered walkways and waiting areas for bus transfers; improved signage and transit information; adequate bus bays for twelve or more simultaneous off-loadings and boardings; and fast, safe access for these buses. This project will provide more convenient and attractive regional transit options for existing and future BART patrons.

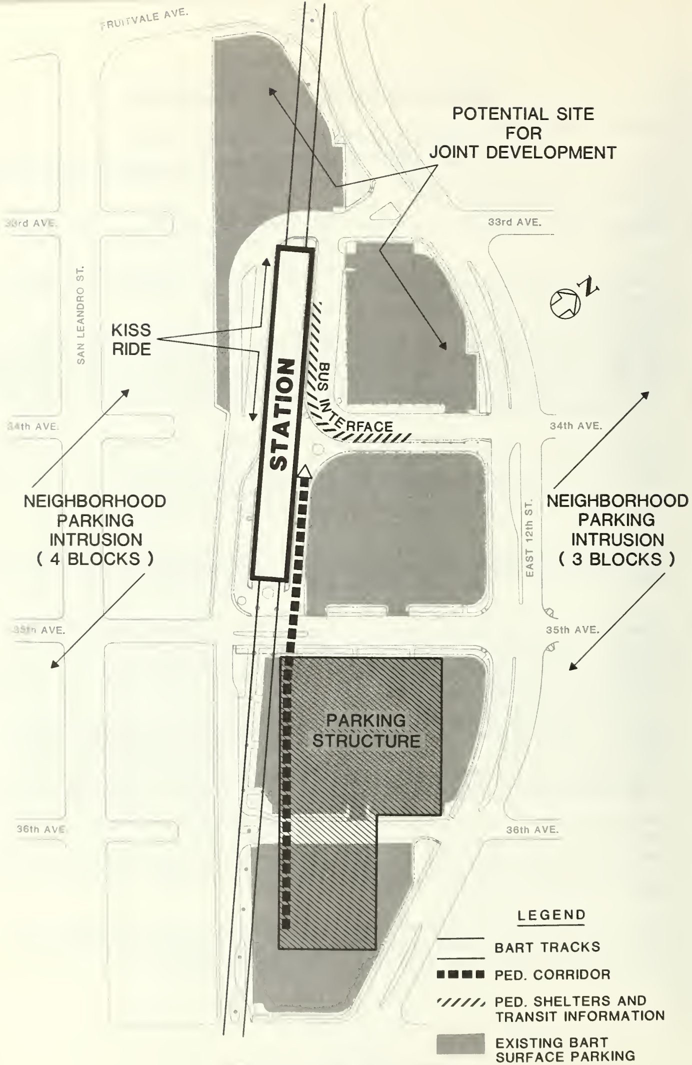
The multi-level parking structure will be designed to provide approximately 860 patron parking spaces within close proximity to the station entrance, and to expand the number of arriving carpool and handicapped patron spaces.

Currently all 787 available BART-provided parking spaces are filled daily. Consequently it is estimated that over 150 patron cars are parked on nearby streets, displacing parking for local residents and business. The existing parking shortage severely limits midday station access, when ample rail patron capacity is available.

The Fruitvale Station latent demand patron parking shortage is currently estimated to be 650 spaces. The problem may be accentuated by possible city-enforced station area parking restrictions and ongoing capacity improvements anticipated with implementation of the Capacity Expansion Program, when additional capacity will become available during peak as well as off-peak periods.

New parking and transit facilities will improve station access and help BART achieve future patronage and revenue growth. The current estimated net revenue loss due to access constraints is $472,000 annually for the Fruitvale Station. The potential for loss of revenue will increase further upon completion of the Capacity Expansion Program.

Fruitvale Station has joint development potential which could be enhanced by the proposed project. That potential could result in long term benefits to patronage, land values and land uses in the station area.



FRUITVALE STATION

ALAMEDA PARK/RIDE (01GG)

PROJECT DESCRIPTION:

This project provides approximately 100 parking spaces in a park/ride facility in the City of Alameda to serve the Fruitvale Station via shuttle service.

PROJECT JUSTIFICATION:

All 787 BART parking spaces at Fruitvale Station are filled by daily, limiting midday station accessibility when rail capacity is available. Net annual revenue loss due to this inaccessibility is currently $472,000 at this station. The potential for loss of revenue will increase upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods.

Over 150 patron cars currently park on nearby streets, displacing parking for local residents and businesses. The latent demand patron parking shortage is currently estimated to be 650 spaces.

Additionally, this project will reduce the number of vehicles needing to cross the congested bridges between Alameda island and the Oakland mainland.

BAYFAIR STATION ACCESS IMPROVEMENTS (01MH)

PROJECT DESCRIPTION:

This project provides bus transit interface improvements and approximately 850 parking spaces (including about 250 site replacement spaces) in a multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

All 1,761 BART parking spaces at Bayfair Station are filled daily, limiting midday station accessibility when rail capacity is available. Net annual revenue loss due to this inaccessibility is currently $512,000 at this station. The potential for loss of revenue will increase upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 640 spaces.

HAYWARD SURFACE LOT EXPANSION (01OF)

PROJECT DESCRIPTION:

This project provides approximately 300 new parking spaces in a surface lot or structure.

PROJECT JUSTIFICATION:

All 967 BART parking spaces at Hayward Station are filled by daily, leading to an estimated net annual revenue loss of $415,000 due to inaccessibility.

The potential for loss of revenue will increase further upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 515 spaces.

UNION CITY SURFACE LOT EXPANSION (01VG)

PROJECT DESCRIPTION:

This project provides approximately 300 parking spaces in a new surface lot.

PROJECT JUSTIFICATION:

All 1,166 BART parking spaces at Union City Station are filled daily, leading to an estimated net annual revenue loss of $465,000 due to inaccessibility. The potential for loss of revenue will increase further upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 445 spaces.

ROCKRIDGE STATION ACCESS IMPROVEMENTS (03E-)

PROJECT DESCRIPTION:

This project provides bus transit interface improvements and approximately 500 parking spaces on a second deck above the existing BART lot.

PROJECT JUSTIFICATION:

All 776 BART parking spaces at Rockridge Station are filled daily, leading to an estimated net annual revenue loss of $159,000 due to inaccessibility. The potential for loss of revenue will increase further upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 350 spaces.

ORINDA STATION ACCESS IMPROVEMENTS (03HG)

PROJECT DESCRIPTION:

This project provides bus transit interface improvements and approximately 700 parking spaces (including about 200 site replacement spaces) in a multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

All 1,047 BART parking spaces at Orinda Station are filled daily, leading to an estimated net annual revenue loss of $324,000 due to inaccessibility. The potential for loss of revenue will increase further upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 380 spaces.

LAFAYETTE SURFACE PARKING LOT (03JE)

PROJECT DESCRIPTION:

This project provides 320 new parking spaces in the existing gravel lot on BART-owned land.

PROJECT JUSTIFICATION:

All 1,132 BART parking spaces at Lafayette Station are filled daily, leading to an estimated net annual revenue loss of $427,000 due to inaccessibility. The potential for loss of revenue due to this inaccessibility will increase further upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 440 spaces.

LAFAYETTE STATION ACCESS IMPROVEMENTS (03JG)

PROJECT DESCRIPTION:

This project provides bus transit interface improvements and approximately 900 parking spaces (including about 200 site replacement spaces) in a multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

All 1,132 BART parking spaces at Lafayette Station are filled daily, leading to an estimated net annual revenue loss of $427,000 due to inaccessibility. The potential for loss of revenue due to this inaccessibility will increase further upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 440 spaces.

WALNUT CREEK STATION ACCESS IMPROVEMENTS (03LG)

PROJECT DESCRIPTION:

This project provides bus transit interface improvements and approximately 1,250 parking spaces (including about 130 site replacement spaces) in a multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

Improved BART system access is in support of the Capacity Expansion Program. a Developing adequate station access facilities will be essential to maximize the productivity of other elements of that Program.

Bus service at Walnut Creek Station currently consists of seven CCCTA scheduled routes, one BART Express Bus route, one CCCTA downtown shuttle bus and numerous private shuttle services. Preliminary discussions with CCCTA indicates that future service needs may more than double the number of simultaneous bus loadings. This program concept is consistent with the proposed project design.

Transit coordination improvements will be designed to include sheltered walkways and waiting areas for bus transfers; improved signage and transit information; adequate bus bays for an increased number of simultaneous off-loadings and boardings; and fast, safe access for these buses This project will provide more convenient and attractive regional transit options for existing and future BART patrons.

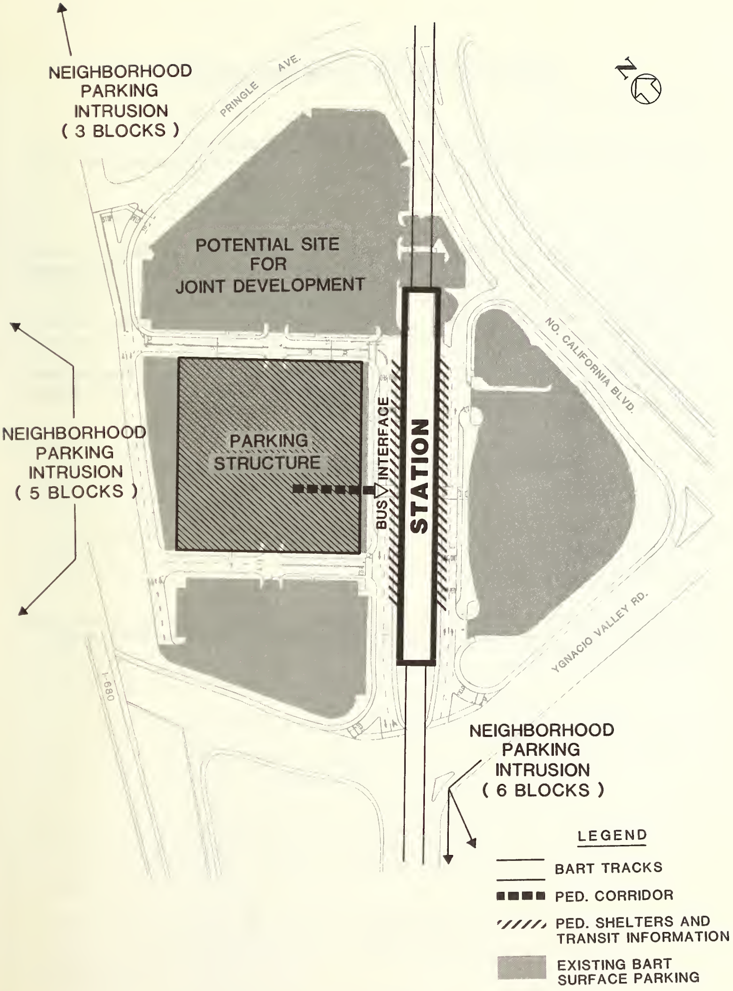
The multi-level parking structure will be designed to provide approximately 1,250 patron parking spaces within close proximity to the station entrance, and to expand the number of arriving carpool and handicapped patron spaces.

Currently all 1,263 available BART-provided parking spaces are filled daily. Consequently it is estimated that over 325 patron cars are parked on nearby streets, displacing parking for local residents and business. The existing parking shortage severely limits midday station access.

The Walnut Creek Station latent demand patron parking shortage is currently estimated to be 855 spaces. The problem will be accentuated by implementation of the Capacity Expansion Program, when additional capacity will become available during peak as well as off-peak periods.

New parking and transit facilities will improve station access and help BART achieve future patronage and revenue growth. The current estimated net revenue loss due to access constraints is $868,000 annually for Walnut Creek Station. The potential for loss of revenue will increase further upon completion of the Capacity Expansion Program.

Walnut Creek Station has joint development potential which could be enhanced by the proposed project. That potential could result in long term benefits to patronage, land values and land uses in the station area.


NEIGHBORHOOD PARKING INTRUSION (3 BLOCKS)
PRINGLE AVE.
N
POTENTIAL SITE FOR JOINT DEVELOPMENT
NEIGHBORHOOD PARKING INTRUSION (5 BLOCKS)
PARKING STRUCTURE
BUS INTERFACE
STATION
NO. CALIFORNIA BLVD.
YGNACIO VALLEY RD.
I-680
NEIGHBORHOOD PARKING INTRUSION (6 BLOCKS)
LEGEND
BART TRACKS
■■■■ PED. CORRIDOR
////// PED. SHELTERS AND TRANSIT INFORMATION
▨ EXISTING BART SURFACE PARKING

WALNUT CREEK STATION

PLEASANT HILL STATION PARKING FACILITY (03NE)

PROJECT DESCRIPTION:

This project provides approximately 1,600 parking spaces (including about 400 site replacement spaces) in a first-phase multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

All 1,678 BART parking spaces at Pleasant Hill Station are filled daily, limiting midday station accessibility when rail capacity is available. Net revenue loss due to this inaccessibility is estimated at $1,776,000 at this station. The potential for loss of revenue will increase further upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods.

Over 350 patron cars currently park on nearby streets, displacing parking for local residents and creating neighborhood parking problems. The latent demand parking shortage is currently estimated to be 1,600 spaces.

PLEASANT HILL REPLACEMENT PARKING FACILITY (03NG)

PROJECT DESCRIPTION:

This project provides approximately 1,600 parking spaces in a second-phase multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

This project will be necessary to consolidate all surface parking into a structure in order to accommodate the joint development of BART's Pleasant Hill Station properties.

CONCORD STATION ACCESS IMPROVEMENTS (03SH)

PROJECT DESCRIPTION:

This project will provide bus transit interface improvements and approximately 1,000 parking spaces (including about 270 site replacement spaces) in a first-phase multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

Improved BART system access is in support of the Capacity Expansion Program. Developing adequate station access facilities will be essential to maximize the productivity of other elements of that Program.

Bus service at the Concord Station currently consists of nine CCCTA scheduled routes, two BART Express Bus lines, and numerous private shuttle services. Preliminary discussions with CCCTA indicate that future service levels may more than double the number of simultaneous bus loadings. This program concept is consistent with the proposed project design.

Transit coordination improvements will be designed to include sheltered walkways and waiting areas for bus transfers; improved signage and transit information; adequate bus bays for an increased number of simultaneous off-loadings and boardings; and fast, safe access for these buses. This project will provide more convenient and attractive regional transit options for existing and future BART patrons.

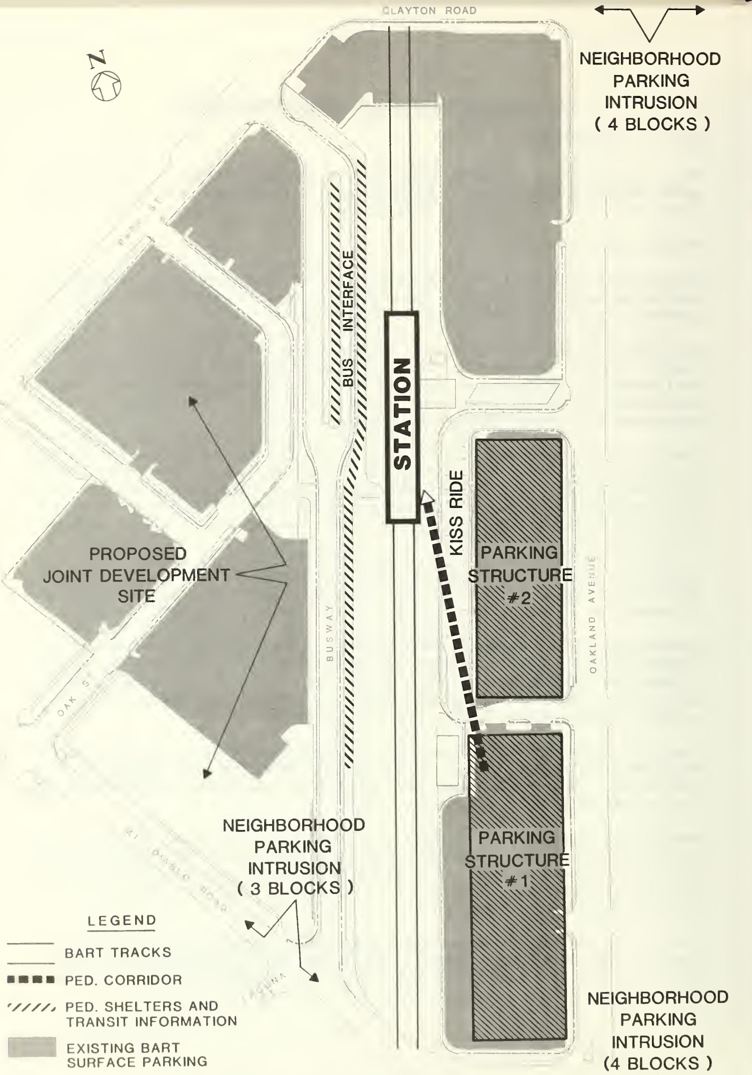
The multi-level parking structure will be designed to provide approximately 900 patron parking spaces within close proximity to the station entrance, and to expand the number of arriving carpool and handicapped patron spaces.

Currently all 1,912 available BART-provided parking spaces are filled daily. Consequently it is estimated that over 370 patron cars are parked on nearby streets and non-BART parking lots, displacing parking for local residents and businesses. The existing parking shortage severely limits midday station access, when ample rail patron capacity is available.

The Concord Station latent demand patron parking shortage is currently estimated to be 1,750 spaces. The problem will be accentuated by implementation of the Capacity Expansion Program, when additional capacity will become available during peak as well as off-peak periods.

New parking and transit facilities will improve station access and help BART achieve future patronage and revenue growth. The current estimated net revenue loss due to access constraints is $2,030,000 annually for the Concord Station. The potential for loss of revenue will increase further upon completion of the Capacity Expansion Program.

Concord Station has a proposed joint development project which would greatly benefit from the proposed project. Additional development potential could result in long term benefits to patronage, land values and land uses in the station area.


CLAYTON ROAD
NEIGHBORHOOD PARKING INTRUSION (4 BLOCKS)
N
PARK ST
BUS INTERFACE
STATION
KISS RIDE
PARKING STRUCTURE #2
OAKLAND AVENUE
PROPOSED JOINT DEVELOPMENT SITE
BUSWAY
OAK ST
PARKING STRUCTURE #1
NEIGHBORHOOD PARKING INTRUSION (3 BLOCKS)
DIABLO ROAD
LAGUNA
NEIGHBORHOOD PARKING INTRUSION (4 BLOCKS)
LEGEND
BART TRACKS
PED. CORRIDOR
PED. SHELTERS AND TRANSIT INFORMATION
EXISTING BART SURFACE PARKING

CONCORD STATION

CONCORD REPLACEMENT PARKING & ADDITIONAL CAPACITY (03S-)

PROJECT DESCRIPTION:

This project provides approximately 1,000 parking spaces (including about 250 site replacement spaces and about 330 joint development site replacement spaces)in a second-phase multi-level parking structure on BART-owned land.

PROJECT JUSTIFICATION:

All 1,912 BART parking spaces at Concord Station are filled daily, leading to an estimated net annual revenue loss of $2,030,000 due to inaccessibility. The potential for loss of revenue will increase further upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 1,750 spaces.

CONCORD INTERIM REPLACEMENT PARKING (03SJ)

PROJECT DESCRIPTION:

This project provides approximately 600 parking spaces as interim replacement parking during construction of the Concord Station Access Improvements.

PROJECT JUSTIFICATION:

All 1,912 BART parking spaces at Concord Station are filled daily, leading to an estimated net annual revenue loss of $2,030,000 due to inaccessibility. The potential for loss of revenue will increase further upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 1,750 spaces.

NORTH BERKELEY SURFACE PARKING LOT EXPANSION (05GB)

PROJECT DESCRIPTION:

This project provides approximately 145 new parking spaces on BART-owned land.

PROJECT JUSTIFICATION:

All 524 BART parking spaces at North Berkeley Station are filled daily, leading to an estimated net annual revenue loss of $112,000 due to inaccessibility. The potential for loss of revenue will increase further upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 150 spaces.

EL CERRITO DEL NORTE SURFACE PARKING LOT (05KD)

PROJECT DESCRIPTION:

This project provides approximately 500 parking spaces in a new surface lot.

PROJECT JUSTIFICATION:

All 1,607 BART parking spaces at El Cerrito del Norte Station are filled daily, leading to an estimated net annual revenue loss of $644,000 due to inaccessibility. The potential for loss of revenue will increase further upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand shortage is currently estimated to be 820 spaces.

EL CERRITO DEL NORTE STATION ACCESS IMPROVEMENTS (05KH)

PROJECT DESCRIPTION:

This project will provide bus transit interface improvements and approximately 1,200 parking spaces (including about 360 site replacement spaces) in a multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

BART system access is in support of the Capacity Expansion Program. Developing adequate station access facilities will be essential to maximize the productivity of other elements of that program.

Bus service to the El Cerrito del Norte Station currently consists of ten AC Transit routes and two BART Express Bus routes. Preliminary discussions with AC Transit indicate that this station may become a transit center allowing for timed transfers and a need to accommodate approximately twelve buses simultaneously. This program concept is consistent with the proposed project design.

Transit coordination improvements will include sheltered walkways and waiting areas for bus transfers; improved signage and transit information; adequate bus bays for twelve or more simultaneous off-loadings and boardings; and fast, safe access for these buses. This project will provide more convenient and attractive regional transit options for existing and future BART patrons.

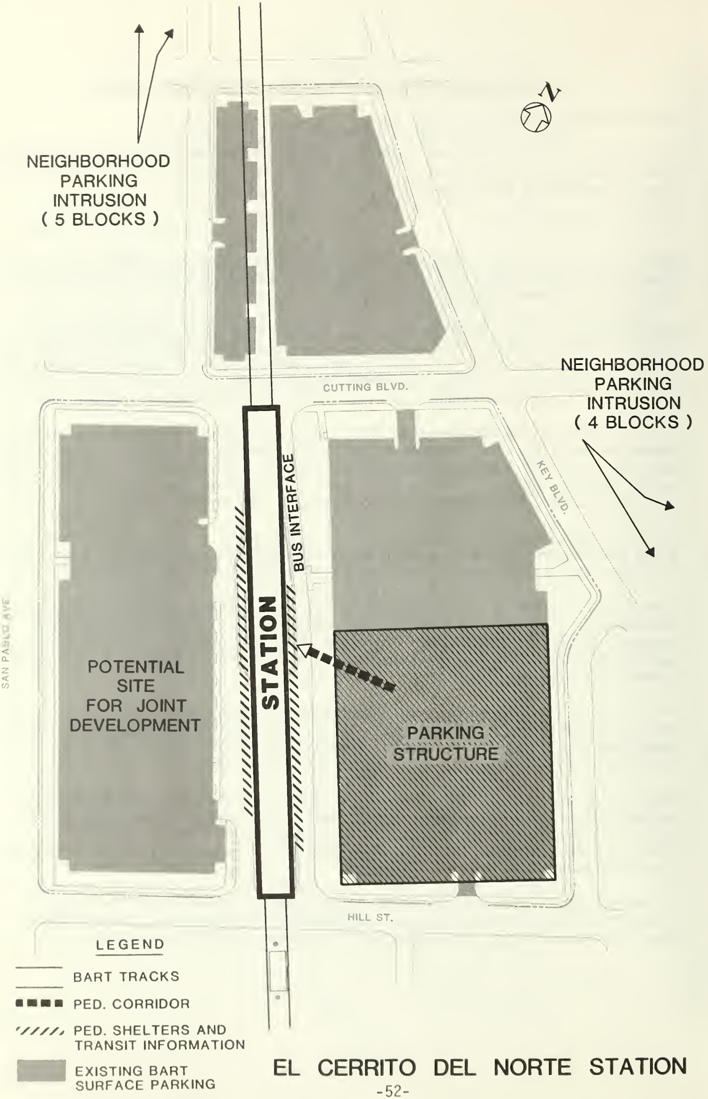
The multi-level parking structure will be designed to provide approximately 1,200 patron parking spaces within close proximity to the station entrance, and to expand the number of arriving carpool and handicapped patron spaces.

Currently all 1,607 available BART-provided parking spaces are filled daily. Consequently it is estimated that over 400 patron cars are parked on nearby streets, displacing parking for local residents and business. The existing parking shortage severely limits midday station access, when ample rail patron capacity is available.

The El Cerrito del Norte Station latent demand patron parking shortage is currently estimated to be 820 spaces. The problem will be accentuated by implementation of the Capacity Expansion Program, when additional capacity will become available during peak as well as off-peak periods.

New parking and transit facilities will improve station access and help BART achieve future patronage and revenue growth. The estimated net revenue loss due to access constraints is $644,000 annually for El Cerrito del Norte Station. The potential for loss of revenue will increase further upon completion of the Capacity Expansion Program.

El Cerrito del Norte Station has joint development potential which could be enhanced by the proposed project. That potential could result in long term benefits to patronage, land values and land uses in the station area.


NEIGHBORHOOD PARKING INTRUSION (5 BLOCKS)
N
CUTTING BLVD.
NEIGHBORHOOD PARKING INTRUSION (4 BLOCKS)
KEY BLVD.
BUS INTERFACE
STATION
SAN PABLO AVE
POTENTIAL SITE FOR JOINT DEVELOPMENT
PARKING STRUCTURE
HILL ST.
LEGEND
BART TRACKS
PED. CORRIDOR
PED. SHELTERS AND TRANSIT INFORMATION
EXISTING BART SURFACE PARKING

EL CERRITO DEL NORTE STATION

COMPLETE WEST END OF RICHMOND LOT (05MD)

PROJECT DESCRIPTION:

Install curb and sidewalks at the west end of the Richmond BART Station.

PROJECT JUSTIFICATION:

BART agreed to complete this work as part of initial system construction. It has been delayed until the City is ready to make planned street improvements around the station.

MACARTHUR STATION ACCESS IMPROVEMENT (07GH)

PROJECT DESCRIPTION:

This project will provide bus transit interface improvements and approximately 900 parking spaces (including about 260 site replacement spaces) in a multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

All 609 BART parking spaces at MacArthur Station are filled daily, limiting midday station accessibility when rail capacity is available. Net annual revenue loss due to this inaccessibility is currently $334,000 at this station. The potential for loss of revenue will increase upon completion of BART's Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods.

Over 125 patron cars currently park on nearby streets, displacing parking for local residents and businesses. The latent demand parking shortage is currently estimated to be 470 spaces. The problem may be accentuated by the impending implementation of station area parking restrictions on non-resident parking.

OAKLAND WEST STATION ACCESS IMPROVEMENTS (11EH)

PROJECT DESCRIPTION:

This project will provide bus transit interface improvements and approximately 1,000 parking spaces (including about 270 site replacement spaces) in a first-phase multi-level structure on BART-owned land.

PROJECT JUSTIFICATION:

Improved BART system access is in support of the Capacity Expansion Program. Developing adequate station access facilities will be essential to maximize the productivity of other elements of that Program.

Bus service to the Oakland West Station currently consists of five AC Transit routes. Preliminary discussions with AC Transit indicate that this station may become a transit center allowing for timed transfers and a need to accommodate approximately seven buses simultaneously. This program concept is consistent with the proposed project design.

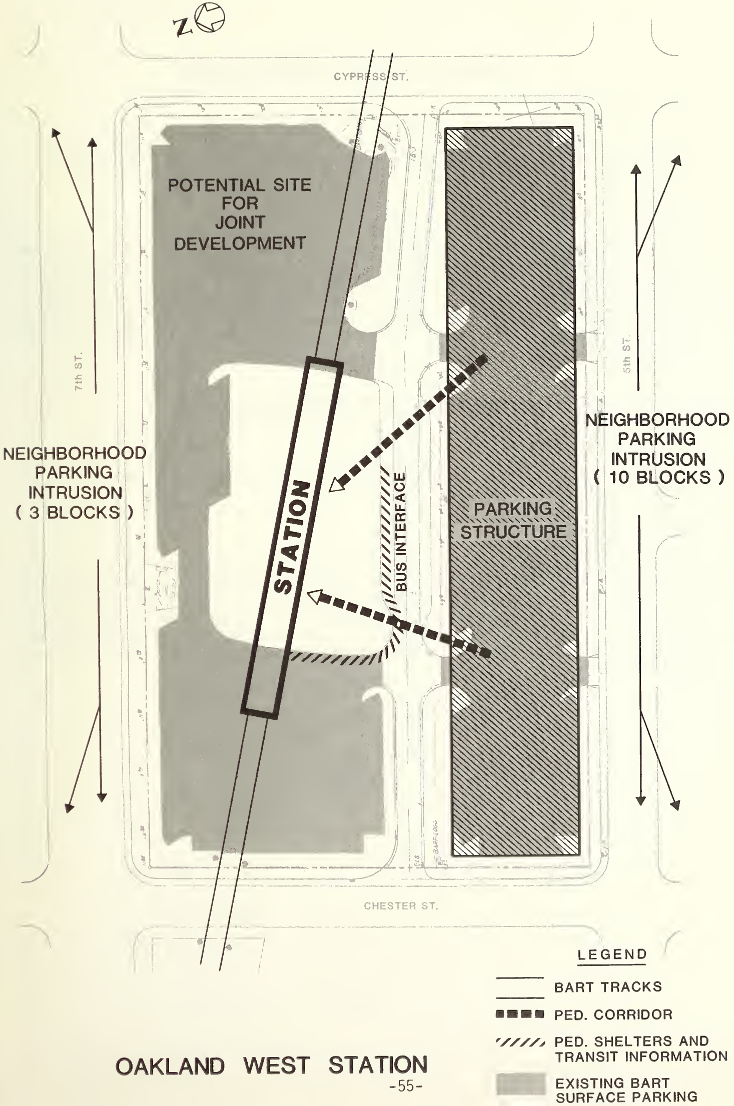
Transit coordination improvements will be designed to include sheltered walkways and waiting areas for bus transfers; improved signage and transit information; adequate bus bays for seven or more simultaneous off-loadings and boardings; and fast, safe access for these buses. This project will provide more convenient and attractive regional transit options for existing and future BART patrons.

The multi-level parking structure will be designed to provide approximately 800 patron parking spaces within close proximity to the station entrance, and to expand the number of arriving carpool and handicapped patron spaces.

Currently all 403 available BART-provided parking spaces are filled daily. Consequently it is estimated that over 800 patron cars are parked on nearby streets and parking lots, displacing parking for local residents and business. The existing parking shortage severely limits midday station access, when ample rail patron capacity is available.

The Oakland West Station latent demand parking shortage is currently estiamted to be 970 spaces. The problem may be accentuated by possible city-enforced station area parking restrictions and ongoing peak hour capacity improvements anticipated with implementation of the Capacity Expansion Program, when additional capacity will become available during peak as well as off-peak periods. This project responds directly to demands for more on-site station parking.

New parking and transit facilities will improve access and help BART achieve future patronage and revenue growth. The estimated current net revenue loss due to access constraints is $669,000 annually for the Oakland West Station. The potential for loss of revenue will increase further upon completion of the Capacity Expansion Program.


N
CYPRESS ST.
POTENTIAL SITE FOR JOINT DEVELOPMENT
7th ST.
NEIGHBORHOOD PARKING INTRUSION (3 BLOCKS)
STATION
BUS INTERFACE
PARKING STRUCTURE
5th ST.
NEIGHBORHOOD PARKING INTRUSION (10 BLOCKS)
CHESTER ST.
LEGEND
BART TRACKS
PED. CORRIDOR
PED. SHELTERS AND TRANSIT INFORMATION
EXISTING BART SURFACE PARKING

OAKLAND WEST STATION

OAKLAND WEST FACILITY - PHASE II (11E-)

PROJECT DESCRIPTION:

This project provides approximately 1,000 parking spaces (including about 270 site replacement spaces) in a combination of new surface lots and a second-phase multi-level structure.

PROJECT JUSTIFICATION:

All 403 BART parking spaces at Oakland West Station are filled daily, limiting midday station accessibility when rail capacity is available. Net revenue loss due to this inaccessibility is $669,000 per year at this station. The potential for loss of revenue will increase further upon completion of the Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 970 spaces.

OAKLAND WEST SURFACE LOT EXPANSION (11ED)

PROJECT DESCRIPTION:

This project will provide approximately 75 parking spaces in a new surface lot on BART-owned land.

PROJECT JUSTIFICATION:

All 403 BART parking spaces at Oakland West Station are filled daily, limiting midday station accessibility when rail capacity is available. Net revenue loss due to this inaccessibility is $669,000 per year at this station. The potential for loss of revenue will increase further upon completion of the Capacity Expansion Program, when rail capacity will become available during peak as well as off-peak periods. The latent demand parking shortage is currently estimated to be 970 spaces.

EXTENSIONS

General

The original plan for the BART system included a multi-phased program to provide rail service well beyond areas presently served. The withdrawal of San Mateo and Marin Counties from the District prior to the 1962 bond election resulted in voter approval of a 71-mile basic system in the current three-county District and indefinitely postponed further development of the rail system. Over the years, the District has continued to coordinate expansion plans with local agencies while investigating the full impacts of extending the system. Extension plans have received extensive public and private review, and they continue to be revised and updated in response to regional growth and changing economic conditions. The extensions program remains in the planning stages. Although extension alignments have been adopted for preliminary planning purposes, no project decisions have been made.

The District's adopted extension policy (as summarized in Figure 6) is divided into three phases. Each phase is sub-divided into "Inside Current District" and "Outside Current District". Also shown are significant details relative to staging and funding of the various phases both inside and outside the current three-county District.

A number of studies of all the extension corridors shown in the figure have been completed. These studies identify the four extensions shown as Phase I, Inside Current District as serving regional needs of the current BART counties. Studies of alternative modes are underway for North Concord-West Pittsburg, Irvington-Warm Springs and Castro Valley-Dublin. Additional detail for these ongoing studies is provided in the text.

Until rail extensions come on line, BART provides express bus service between key transfer stations and these regional travel corridors. Park/ride lots have been constructed to support the express bus service. Most of these park/ride lots are located at proposed future station sites.

Given the need to further define potential extension alignments, complete required state and federal environmental studies and identify adequate funding, extension project approval and specific site location decisions remain to be made.

The following discussion covers five extension corridors: Fremont-South Bay, Livermore-Pleasanton, Pittsburg-Antioch, West Contra Costa County and San Francisco Muni Metro. Figure 7 shows the funding status for right-of-way acquisitions and for planning studies. Shown are past and currently active Extensions related projects including right-of-way and some park/ride related projects. Note that completed projects shown in the tables are not found in the financial projections (Figures 8 & 9).

PHOTOGRAPH: AERIAL VIEW OF FREMONT STATION

THE PROPOSED WARM SPRINGS EXTENSION WOULD EXTEND SOUTHWARD FROM FREMONT STATION AND FOLLOW THE SOUTHERN PACIFIC RIGHT-OF-WAY.

Figure 6

BART EXTENSION STAGING POLICY

(The several segments shown under each Roman numeral are understood to be implemented concurrently, to the extent that funding is available.)

(BART will be the operator for any new heavy or light rail transit starts or extensions within the three BART counties except for those projects developed by existing rail transit operators.)

INSIDE CURRENT DISTRICT	OUTSIDE CURRENT DISTRICT
	(Subject to a satisfactory cost-sharing arrangement and parallel construction within the District.) ***
I. North Concord/West Pittsburg Irvington/Warm Springs Castro Valley/Dublin MUNI Metro Extension Project *	I. Colma/Tanforan/San Francisco Airport Milpitas
II. Pittsburg/West Antioch/East Antioch Pleasanton/West Livermore/East Livermore San Francisco ** San Pablo/Hilltop Oakland Airport Connector	II. Millbrae - Menlo Park Milpitas - San Jose
III. San Francisco ** Pinole/Hercules San Ramon Corridor	III. San Jose - Menlo Park

* The San Francisco Project is identified through coordination with the City and County of San Francisco as the MUNI Metro Extension to the CALTRAIN Depot South of Market.

** Specific San Francisco Project to be identified through coordination with the City and County of San Francisco. Section 29034.5 of the California Public Utilities Code Lists an extension of District services and facilities to the northwest section of the City and County of San Francisco as a District service commitment.

*** Pursuant to Section 29034.5 of the California Public Utilities Code, only non-District funds may be spent by the District for the purpose of extending services and facilities outside of District's January 1, 1971 boundaries until the District meets specified service commitments within the 1971 boundaries.

Board adopted September 1, 1983; Board amended February 2, 1984;
Board amended October 23, 1986; Board amended May 14, 1987.

Figure 7

EXTENSIONS PROJECTS - ALL PHASES
$ 000

ACQUISITIONS AND PROGRAMED FUNDS

PMS#	PROJECTS	ACQUISITIONS	FUNDED	UNFUNDED	TOTAL
0-B-&	EXTENSIONS R-O-W ACQUISITION (Note 1)	$8,600	$5,700	$57,372	$71,672
02AC	FREMONT SO. BAY STUDY & AA/EIS		$1,908		$1,908
04AC	EIR & PREL. ENGRG.-PITTS./ANTIOCH		$2,373		$2,373
04CB	WILLOW PASS GRADE		$2,000		$2,000
04IA	RAILROAD AVENUE PARK/RIDE		$132	$526	$658
04KA	SOMERSVILLE ROAD				$3,445
	PARK/RIDE		$1,357		
	EXTENSIONS		$2,088		
06KA&	HERCULES				$3,471
	PARK/RIDE		$1,100		$1,100
	EXTENSIONS (Notes 2,4)	$2,371			
08AB	LIVERMORE EXTENSIONS PLANNING		$1,683		$1,683
08GA	DUBLIN/PLEASANTON PARK/RIDE	$11,177	$2,119		$13,296
08KA	WEST LIVERMORE PARK/RIDE		$3,000		$3,000
	WARM SPRINGS STATION (Note 2)	$9,487			$9,487
	NORTH CONCORD MARTINEZ PARK/RIDE(Note 3)	$720			$720
	BAILEY ROAD (Note 2)				$3,550
	PARK/RIDE	$1,081			
	EXTENSIONS	$2,469			
	HILLCREST AVENUE PARK/RIDE (Note 2)	$1,580			$1,580
	SUBTOTAL	$35,114	$23,460		
	TOTAL		$58,574	$57,898	$116,472

Note 1: Includes Irvington Station, Castro Valley Station, Hercules Extension and Warm Springs Track Alignment

Note 2: Completed project not shown in financial projections.

Note 3: Land lease at station site - not purchase

Note 4: Hercules Extensions land counted in Extensions ROW Acquisitions and excluded from subtotal and total.

Fremont-South Bay Corridor

General Description:

Phase I (Inside Current District) of the extension alignment begins at the Fremont BART Station embankment, then follows a subway-direct routing under Lake Elizabeth and Fremont Central Park before moving alongside the Union Pacific Railroad right-of-way at-grade or slightly depressed. The BART alignment transitions into subway and continues under Washington Boulevard to the Irvington Station and remains depressed in an open cut to north of Durham Road. The alignment continues under Durham Road crossing over Grimmer Boulevard to arrive at the Warm Springs Station.

Phase I (Outside Current District) begins at the Warm Springs Station and generally follows the Southern Pacific Railroad right-of-way through Milpitas. Phase II continues from Milpitas to San Jose in at-grade and aerial configurations along the Southern Pacific Railroad right-of-way. The alignment would be underground along 10th Street in San Jose to Santa Clara Avenue and turn west to a terminal in the vicinity of the Cahill Caltrain station in San Jose.

Planning Status:

Fremont-South Bay AA/DEIS (02AC)	$1,908,000

The purpose of this study is to identify viable transportation alternatives for the corridor between the BART Fremont Station and the cities of Milpitas, San Jose, Santa Clara, Sunnyvale and Mountain View. On April 30, 1987, the multi-agency policy committee for this study selected five alternatives for further study. These five alternatives are: (1) No Build Alternative; (2) Transportation Systems Management (TSM) strategies; (3) Express Bus/HOV Lanes; (4) BART from Fremont to downtown San Jose/ Guadalupe LRT from Milpitas to Sunnyvale and/or Mountain View, and (5) LRT from Fremont to Milpitas and westward from Milpitas to Sunnyvale and/ or Mountain View.

Park/Ride:

There are currently no park/ride lots associated with this corridor.

Right-Of-Way Acquisition:

Irvington Station (02--)	$1,627,000*
Warm Springs Station (02--)	$9,478,000*
Track Alignment (02--)	$1,035,000*

The acquisitions listed above are in partial support of a possible Phase I extension in this corridor.

Footnote:

* Funds have been expended in the past and are shown in Figure 7, but not in the financial projections (Figures 8 and 9).

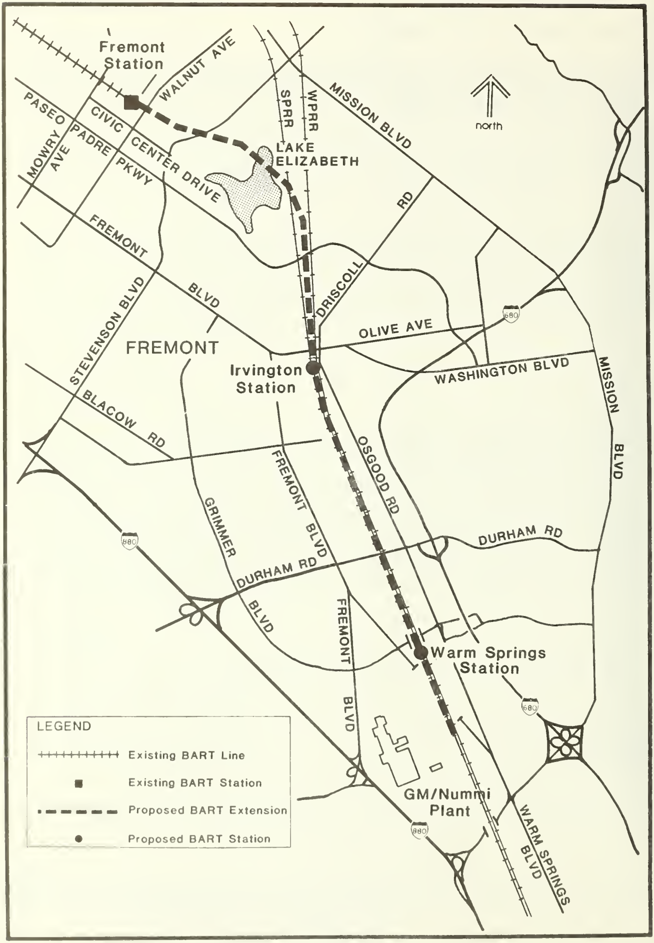
Phase I Construction:

Warm Springs Extension (02--)	$370,000,000

If BART is selected as the preferred alternative, this project would consist of 5.4 miles of double track and two stations, one at Irvington and the other at Warm Springs.

WARM SPRINGS EXTENSION

Inside Current District Phase I



Pittsburg-Antioch Corridor

General Description:

Phase I of this extension alignment begins at the existing BART Concord Station, then follows the abandoned Sacramento Northern Railroad right-of-way paralleling Port Chicago Highway to Highway 4. The alignment then swings eastward and transitions into the median of Highway 4 to West Pittsburg. Phase II of the alignment extends from West Pittsburg to Antioch along Highway 4.

Planning Status:

Pittsburg-Antioch AA/DEIS (04AC)	$ 2,373,000
Willow Pass Grade (04CB)	$ 2,000,000
Total	$ 4,373,000

The purpose of this study is to develop transportation alternatives in the corridor from the Concord BART Station to Pittsburg and Antioch. On April 30, 1987, the multi-agency policy committee for this study selected seven alternatives for further study. These seven alternatives are: (1) No Build; (2) Transportation Systems Management (TSM) strategies; (3) HOV lanes to Antioch; (4) Light rail to Antioch via Highway 4; (5) Light rail to Antioch via Highway 4 and Southern Pacific Transportation Company Alignment; (6) BART to North Concord, and (7) BART to Antioch via Highway 4.

BART has agreed to contribute $2 million to Contra Costa County for project development costs associated with lowering the Willow Pass Grade to support a rail extension project.

Park/Ride:

North Concord-Martinez (04--)	$ 720,000*
Bailey Road (04--)	$ 1,081,000*
Railroad Avenue (04IA)	$ 658,000
Somersville Avenue (04KA)	$ 1,357,000
Hillcrest Avenue (04--)	$ 1,580,000*

There are five park/ride lots associated with the Pittsburg-Antioch Corridor. The North Concord-Martinez, Bailey Road, and Hillcrest Avenue lots are currently open for public use. The other two, Railroad Avenue and Somersville Road, are possible future land purchases. These lots are served by BART express bus service to Concord Station. Except for the North Concord-Martinez park/ride lot which is leased from the U.S. Navy, it is anticipated that all of the park/ride facilities are, or will be, on BART-owned land. The costs associated with the North Concord-Martinez lot are for construction and a five-year lease. The costs for the other lots include land purchase and construction except as noted.

Footnote:

* Funds have been expended in the past and are shown in Figure 7, but not in the financial projections (Figures 8 and 9).

Right-Of-Way Acquisition:

North Concord-Martinez Station (04--)	*
West Pittsburg Station (Bailey) (04--)	$ 2,469,000**
Pittsburg Station (Railroad Ave.) (04--)	*
West Antioch Station (Somersville) (04--)	$ 2,088,000
East Antioch Station (Hillcrest) (04--)	*
East Antioch Yard (04--)	*

These acquisitions are in partial support of Phases I and II of a possible BART rail extension in this corridor.

Phase I Construction:

North Concord/West Pittsburg Extension (04--)	$ 425,000,000

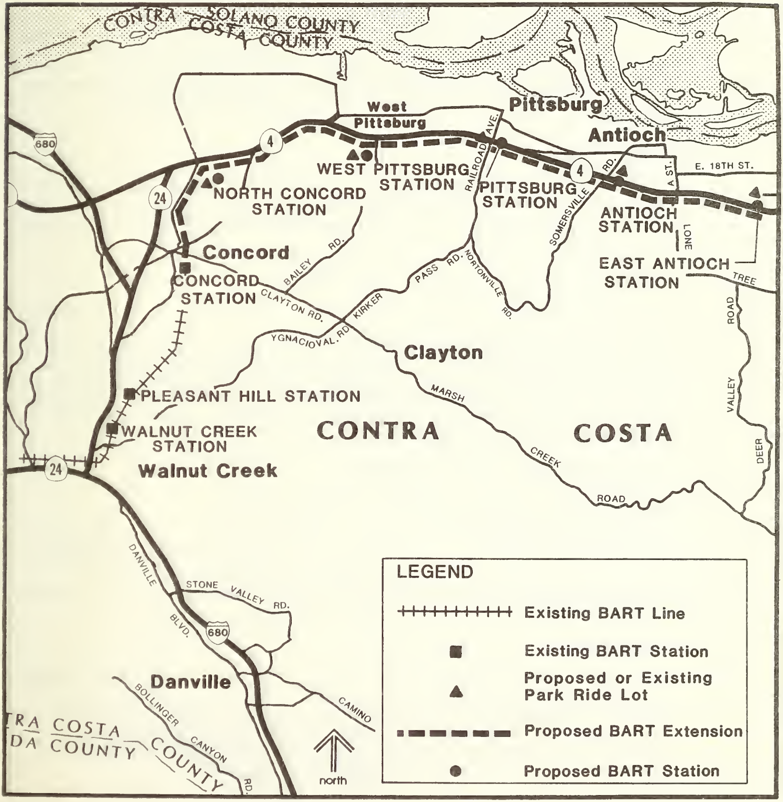
If BART is selected as the preferred alternative for this corridor, this project would include 5.4 miles of double track and two stations, one at North Concord and the other at West Pittsburg.

Footnote:

* Cost estimates not shown because costs are not included in Figures 7, 8, or 9.

** Funds have been expended in the past and are shown in Figure 7, but not in the financial projections (Figures 8 and 9).

BART PITTSBURG – ANTIOCH EXTENSION
Inside Current District Phases I and II



West Contra Costa County Corridor

General Description:

This extension alignment extends northward from the existing BART Richmond Station along the Santa Fe Railroad right-of-way to Rumrill Boulevard in San Pablo, then along Rumrill Boulevard to the vicinity of Contra Costa College, then northward to Hilltop Mall, and finally northward along I-80 through the Cities of Pinole and Hercules to the Highway 4/I-80 interchange.

Planning Status:

The West Contra Costa County Extension Study Final Report was completed in June 1983. A station study for this corridor has been proposed. Participants in the study would be the County, BART and the cities in West Contra Costa County.

Park/Ride:

Hercules Park/Ride (06KA)	$ 1,100,000

One park/ride lot is associated with this corridor. A portion of a possible site for the proposed station has been purchased and is compatible with a park/ride lot. However, a specific site selection decision has not been made. The park/ride facility has not been constructed. This park/ride lot would be served by BART express bus service to Richmond or El Cerrito del Norte Station.

Right-Of-Way Acquisition:

San Pablo Station (06--)	*
Hilltop Station (06--)	*
Pinole Station (06--)	*
Hercules Station (06--)	$2,371,000

One parcel has been purchased in support of a possible Phase III extension in this corridor.

Construction:

West Contra Costa County Extension (06--)	$435,000,000

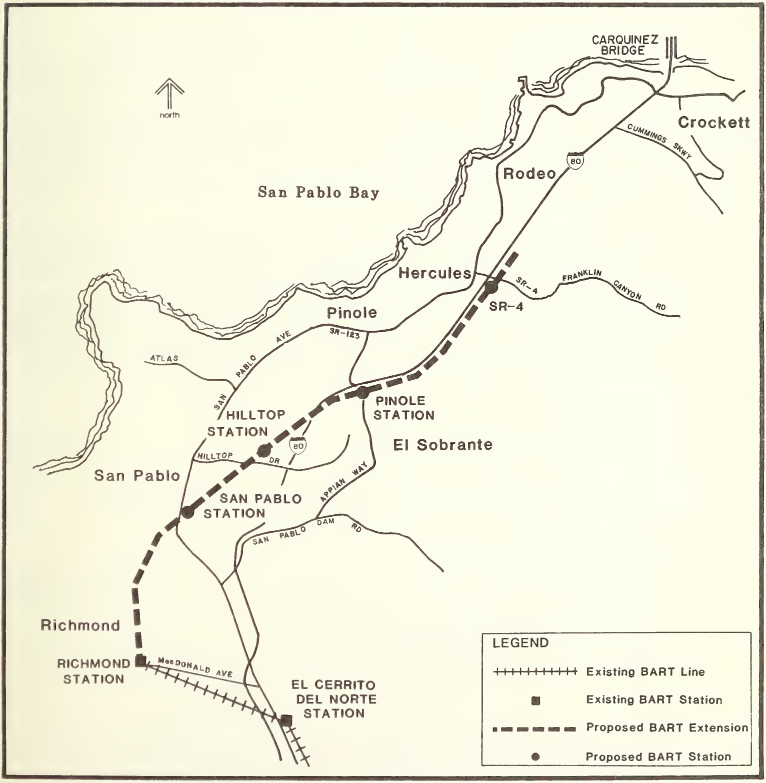
Possible construction of this extension falls into Phases II and III of BART's Board adopted extension policy. Therefore, there is no Phase I construction. The cost shown here is for the entire extension with four stations.

Footnote:

* Cost estimates not shown because costs are not included in Figures 7, 8, or 9.

WEST CONTRA COSTA EXTENSION

Inside Current District Phase II and III



Livermore-Pleasanton Corridor

General Description:

Phase I of the extension alignment extends from the existing BayFair Station in San Leandro and follows along Highway 238 and Interstate 580, terminating near the I-580/I-680 interchange in Dublin and Pleasanton. Phase II extends the alignment along I-580 to East Livermore.

Planning Status:

Livermore Extension Planning (08AB)	$ 1,683,000

BART is currently participating in a study with the Livermore-Amador Valley Transit Authority (LAVTA). This study grew out of Measure B which was approved by the voters in Alameda County in November 1986. One requirement of Measure B was for BART and LAVTA to conduct an analysis to determine whether the proposed rail extension in this corridor will be BART or a light rail system.

Measure B increased the state sales tax in Alameda County by one-half cent for the purpose of funding a variety of highway and public transit projects. One of the projects to be funded from Measure B is a rail extension in the Dublin corridor, which is equivalent to Phase I of BART's Livermore-Pleasanton Extension. The revenues generated by this initiative can be used for both Alameda County BART rail extensions (the Warm Springs and the Dublin Corridor extensions). However, the primary rail extension to be funded from Measure B is a rail extension in the Dublin corridor. Measure B will fund up to $170 million of this $220 million project.

Park/Ride:

Dublin-Pleasanton Park/Ride (08GA)	$13,296,000
West Livermore Park/Ride (08KA)	$ 3,000,000

Two sites for possible park/ride lots have been acquired; however construction of these lots has not been approved.

Right-Of-Way Acquisition:

Castro Valley Station (08--)	$ 2,200,000*
Dublin Station (08--)	**
Pleasanton Station (08--)	**
West Livermore Station (08XX)	**
East Livermore Station (08--)	**
East Livermore Yard (08--)	**

Footnote:

* Funds have been expended in the past and are shown in Figure 7, but not in the financial projections (Figures 8 and 9).

** Cost estimates not shown because costs are not included in Figures 7, 8, or 9.

Three acquisitions have been made in support of a possible Phase I extension. Two of these sites coincide with possible park/ride lots.

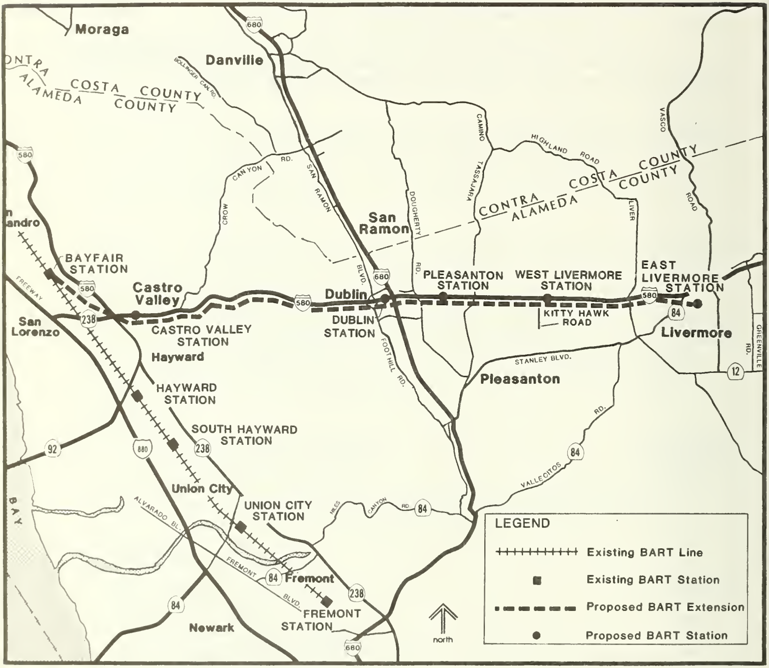
Phase I Construction:

Dublin Corridor Extension (08--)	$220,000,000

If BART is selected to be the rail operator in this corridor, the first phase of this project would include 12.8 miles of double track and two stations, one in Castro Valley and the other in Dublin.

LIVERMORE–PLEASANTON EXTENSION

Inside Current District Phase I and II



San Francisco Muni Metro

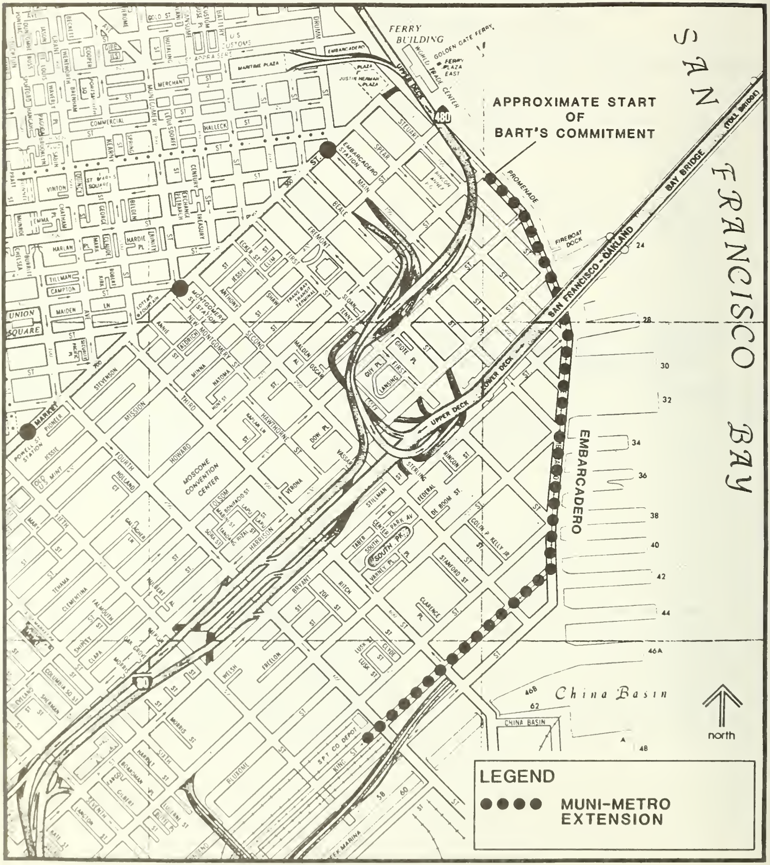
San Francisco Muni Metro (99*79)	$ 15,000,000

The District's Phase I extension policy identifies a San Francisco transit project. Subject to specific Board approval, BART has agreed to make a contribution to a Muni Metro rail extension. The project cost shown here is the first increment of funding for this project and is for preliminary engineering and design. MUNI has lead responsibility for meeting planning requirements for this project.

SAN FRANCISCO COMMITMENT

(Muni-Metro Extension)

Inside Current District Phase I



CHAPTER II

FINANCIAL PLAN

DESCRIPTION

Financing for the Capital Improvement Plan is described here. Basically, funding comes from Federal, State, Regional, County or BART sources. As stated previously, BART's Capacity Expansion projects are virtually 100 percent funded. Likewise, a number of the important basic system projects are funded. Funding for these two areas, while requiring continued attention, appears very likely.

Funding for the Station Access Improvement projects and Extensions is not assured. Continued cuts in the Federal Capital program are seriously impacting funding prospects. Station Access projects could be funded from the Federal program, provided Regional priorities at the Metropolitan Transportation Commission (MTC) level supported them. In addition, a significant number of Station Access projects are being funded from BART sources.

Extensions funding is of such a magnitude that Congressional "earmarking" will likely be required. In the coming years, significant local consensus in support of the projects will have to develop to obtain Congressional action.

CASH FLOW PROJECTIONS

Figures 8 and 9, which follow, provide cash flow estimates for each of the projects in the program with the exception of extensions implementation. Projects are listed by type of equipment/structure and by FMS number within type.

Figure 8 shows funded and partially funded projects. A project is considered funded if there has been a formal action by a funding agency (UMTA, CTC, etc.) or it is to be paid for from BART sources. Figure 9 shows unfunded projects and unfunded portions of partially funded projects. It also shows "Program Year Amount." This is the amount and schedule required for grants to fund the project. Programming of outside grant sources is generally controlled by MTC.

Cash flows shown in Figures 8 and 9 result in projections of annual cash requirements from each source. Figures 10 and 11 provide these projections by source. Overall the tables show some $914.7 million in projects that are scheduled and for which funds are planned for expenditure in the coming five years. Of that total, $699.4 million is funded.

The tables do not include extensions implementation funding because of the magnitude of these projects.

EXTENSIONS

BART's extension program will involve a level of financial commitment more substantial than any since the construction of the original 71-mile system. A combination of local, state and federal funding will be necessary to accomplish the proposed program.

BART's efforts to advance the extension program have three components:

1. Completion of required planning evaluations necessary to qualify for grant programs. Alternatives analyses are expected to be completed in four corridors within the next year.

2. Careful utilization of BART capital reserves to acquire rights-of-way key to possible future extensions. Over $30M has been expended to date for this purpose.

3. Advocacy of BART extensions with funding sources at the federal, state and local levels. Voters in Alameda County approved a sales tax increase in November 1986 which includes $170M for a rail extension to Dublin. Similar votes are expected in other counties during the next year.

Expenditures to date were listed in the descriptions of individual corridors. An additional $70M of BART capital reserves is available for extension projects. Allocation of these funds will be coordinated with local plans and other extension funding programs. The identification of $70M as available for extension projects does not constitute a funding decision. Authorization to spend these funds must be specifically approved by the Board of Directors. Actual amounts could change based upon available reserves and timing of extension projects.

BART RESERVES PROJECTIONS

The cash drawdowns shown in Figures 8 and 9 result in spending of BART reserves, which are shown in Figure 12. Starting with an estimate of cash balances in capital accounts as of the beginning of the planning period, interest is calculated at a 7% rate. This calculation results in anticipated interest earnings over the 5 years of some $47.7 million. Reserves plus interest and capital transfers from the operating budget result in an estimated balance available for expenditure in the 5-year period of $334.3 million.

Some $256.4 million in expenditures are planned from these capital sources with another $70 million identified for extensions. When these expenditures are subtracted from the balance available, the result is $7.1 million in contingency as shown in the table. This is thought to be a reasonable contingency given the magnitude of the Capital Improvement Program.

Figure 8

BART FIVE-YEAR FUNDED CAPITAL PROGRAM ($X1000)

			CASH FLOWS					
FMS NO.	PROJECT NAME	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
	GROUP: VEHICLE								
413J	REINSTALL 6TH CAPAC. & MOD DLR	150	13	0	0	0	0	0	163
41GB	2ND GENERATN ATO/139 A-CAR SETS	0	76	5200	8524	0	0	0	13800
42AA	150 2ND GEN TRANS VEH W/ PRO ATC	36000	105000	87298	0	0	0	0	228298
	SUBTOTAL	36150	105089	92498	8524	0	0	0	242261
	GROUP: FACILITIES, MAINLINE								
0-8-	EXTENSIONS R.O.W. ACQUISITION	2662	11638	0	0	0	0	0	14300
02AC	FREMONT-SO. BAY STUDY & AA/EIS	319	120	734	735	0	0	0	1908
03FL	BOOSTER FIRE PUMP/W PORTAL BHT	36	117	0	0	0	0	0	153
04AC	EIR & PREL ENGRG/ P-LINE PH I	956	750	667	0	0	0	0	2373
04CB	WILLOW PASS GRADE	0	2000	0	0	0	0	0	2000
08AB	L-LINE EXTENSION PLANNING	1110	573	0	0	0	0	0	1683
11--	DALY CITY TURNBACK & YARD	90688	41091	9521	0	0	0	0	141300
11TD	SHOP FACILITIES - ODY	524	2534	0	0	0	0	0	3058
	SUBTOTAL	96295	53823	10922	735	0	0	0	166775
	GROUP: FACIL.,STATION & ACCESS								
0--6	PRKNG PROD IMPR (1942SP)	1800	3073	0	0	0	0	0	4873
01GG	100-SP ALAMEDA PRK/RD-FVS (III)	0	0	0	0	0	0	429	429
01NK	EMPLOYEE BREAK ROOM-HAS	0	27	17	0	0	0	0	44
013F	300-SP PKG EXPAN-HAS	0	2100	474	0	0	0	0	2574
01SD	CONSOLIDATE COMP RPR - OHY	0	235	0	0	0	0	0	235
01SP	C-CAR MGT TEAM OFCS/RM 225-OHY	0	56	0	0	0	0	0	56
01ST	CANOPY STORAGE SHED - OHY	0	58	0	0	0	0	0	58
01VG	500-SP SATELLITE LOT-UCS (II)	0	2200	1873	0	0	0	0	4073
03JE	PERM IMPRVT/CALTRANS LOT-LAS(I)	250	521	0	0	0	0	0	771
03NE	1600-SP WESTLOT EXPANSN-PHS (I)	2383	9651	6338	0	0	0	0	18372
03PJ	AD'L ATC WORK SPACE @ TC RM-CCY	20	25	0	0	0	0	0	45
03RB	ADD PLATFORM STAIRWAY - CDS	0	0	136	0	0	0	0	136
03S-	CONCORD RPL PKG & AD'L CAPACITY	0	0	0	0	0	0	11000	11000
03SJ	475-SP WST CONC (CCWELL)LOT-CDS	0	200	328	0	0	0	0	528
04IA	PK/RIDE LOT RAILROAD AVE-PTS	0	132	0	0	0	0	0	132
04KA	PK/RIDE LOT/SOMERSVILLE RD-WAS	0	1357	0	0	0	0	0	1357
04KA	EXTENSION/SOMERSVILLE RD-WAS	0	1643	445	0	0	0	0	2088
04RA	BRENTWOOD PARK/RIDE	0	290	0	0	0	0	0	290
05GB	ADD PRK FACILS/VIRGINIA ST-NBS	105	139	0	0	0	0	0	244
05KD	1164-SP PKG EXP/MAYFR-CNS (II)	10	0	0	0	0	0	2111	2121
05MD	COMPLETE WEST END OF LOT (RIS)	0	0	0	0	0	0	100	100
05NJ	AD'L ATC WRK SPACE @ TC RMS-RIY	43	28	0	0	0	0	0	71
05KA	500-SP PK/RIDE LOT/I&II-HRS(XR)	0	1100	0	0	0	0	0	1100
05KA	EXTENSION/-HRS(XR)	2000	300	71	0	0	0	0	2371
08GA	1400-SP PK/RIDE LOT W/ BRDG-DUB	12000	400	896	0	0	0	0	13296
08KA	WEST LIVERMORE PARK/RIDE	0	3000	0	0	0	0	0	3000
10AJ	I-680 -X-BUS ON-RAMP PADS-SLRN	0	0	0	0	0	0	148	148
11E-	OAK WEST FACIL - PHASE II	0	0	0	0	0	0	12000	12000
11ED	58-SPACE PARKING EXPN-OWS (II)	0	89	0	0	0	0	0	89
11FG	2 END STAIRWAYS-PLATF/MEZZ-EMS	0	387	0	0	0	0	0	387
11FH	STA VENT FAN CONTROL MODS	113	29	0	0	0	0	0	142
11JF	PLAZA ENTRNCE FENCNG 16TH & 24TH	31	49	0	0	0	0	0	80
15AZ	WET STNDPIPES & FD CONNS-21 STA	83	600	535	0	0	0	0	1218

Figure 8

BART FIVE-YEAR FUNDED CAPITAL PROGRAM ($X1000)

FMS NO.	PROJECT NAME	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
			CASH FLOWS						
	GROUP: FACIL.,STATION & ACCESS								
15LC	ESCALATOR REHAB PROGRAM	4290	1025	767	0	0	0	0	6082
15NG	SELF OPERATN-ELEVATORS/HNDICPD	890	1000	906	0	0	0	0	2796
15NH	TEXTURED PLATFORM EDGE III	122	1221	0	0	0	0	0	1343
155A	UNDRGRND STORAGE TANK MONITORS	0	95	0	0	0	0	0	95
178R	1985 BPS DFC & SPACE MODS - LMA	73	95	0	0	0	0	0	168
173S	5TH FLOOR REFURBISHMNT/1986-LMA	9	93	0	0	0	0	0	102
173J	REMODEL TELEPHONE CENTER - LMA	0	32	0	0	0	0	0	32
17FD	BLDG MODS STRUCT/ELECT/MECH-STB	87	42	0	0	0	0	0	129
59CK	PLATFORM TRAIN SCHEDULE SIGNS	0	143	0	0	0	0	0	143
99*8	ENTRANCE CANOPIES	0	0	0	0	0	0	8000	8000
	SUBTOTAL	24309	31435	12786	0	0	0	33788	102318
	GROUP: FACILITIES,SUPPORT								
01R8	VEHICLE WASHER-HAY	0	45	0	0	0	0	0	45
17HF	AFC MNT SHOP/EMP REL-XEROX-MET	0	32	0	0	0	0	0	32
	SUBTOTAL	0	77	0	0	0	0	0	77
	GROUP: TRAIN CONTROL								
20--	WAYSIDE TC & SYSTEM PEFOR MODS	3008	8788	2858	275	0	0	0	14929
20AC	ELIMINATE STATION INTERFACES	2163	100	137	0	0	0	0	2400
20BF	TIMELOCKING MODIFICATIONS	28	300	107	0	0	0	0	435
20FD	OPTIMIZE SPEED PROFILES	145	200	144	0	0	0	0	489
21EB	ACI SYSTEM IMPROVEMENTS HAY	73	246	0	0	0	0	0	319
61--	INTEGRATED CONTROL SYSTEM - ICS	23748	8574	3428	490	0	0	0	36240
	SUBTOTAL	29165	18208	6674	765	0	0	0	54812
	GROUP: AFC & COMMUNICATIONS								
273B	RADCOM	3300	435	0	0	0	0	0	3735
45AN	MULTI-DENOMINATN BILL VALIDTRS	0	151	0	0	0	0	0	151
45BF	IBM TICKET TRANSPORT RETROFIT	723	480	472	0	0	0	0	1675
45BK	MUNI FAST PASS ANTI-FRAUD MODS	0	48	0	0	0	0	0	48
65W8	C&CR AFC RELIABILITY REPORTING	0	79	0	0	0	0	0	79
79LC	PORTABLE RADIOS	0	46	0	0	0	0	0	46
	SUBTOTAL	4023	1239	472	0	0	0	0	5734
	GROUP: ELECTRIFICATION								
03FK	2ND PWR TRANSFORMR/E.PORTL-BHT	135	124	0	0	0	0	0	259
09FE	RPLC PCB TRANSFORMERS @ SF VENT	107	400	221	0	0	0	0	728
15EG	ELECTRICAL CAPACITY IMPROVEMNTS	1393	2350	4047	0	0	0	0	7790
15EX	PG&E RATE EVAL/ALT SOURCES	116	60	0	0	0	0	0	176
20HB	ADD'L STATION ESSENTIAL POWER	0	388	0	0	0	0	0	388
	SUBTOTAL	1751	3322	4268	0	0	0	0	9341
	GROUP: PROCUREMENTS								
15CL	RAIL REPL PH V (86/7)	0	439	0	0	0	0	0	439
15CM	2ND RAIL REPLCMT - PHS I 87/8	0	281	0	0	0	0	0	281
79AC	NEW VANS FY 85/86	0	27	0	0	0	0	0	27
79AC	NEW VANS FY 87/88	0	32	0	0	0	0	0	32
79AD	NEW PICKUPS FY 85/86	0	15	0	0	0	0	0	15
79AD	NEW PICKUPS FY 87/88	0	11	0	0	0	0	0	11

Figure 8

BART FIVE-YEAR FUNDED CAPITAL PROGRAM ($X1000)

		CASH FLOWS							
FMS NO.	PROJECT NAME	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
	GROUP: PROCUREMENTS								
79DA	NEW HI-RAILERS - GEN FY 86/87	0	0	0	232	0	0	0	232
79DA	NEW HI-RAILERS - GEN FY 87/88	0	0	0	75	0	0	0	75
79KF	NEW SAFETY EQUIPMENT-TR-117	0	76	0	0	0	0	0	76
79MP	RAIL GRINDER	0	992	0	0	0	0	0	992
	SUBTOTAL	0	1873	0	307	0	0	0	2180
	GROUP: OTHER COSTS								
11J-	DALY CITY INTERMODAL FACILITY	11	0	0	0	0	0	1789	1800
93DP	INVENTORY BUILDUP	10836	4670	1867	1000	2664	2370	0	23407
99*5	LAND AND LAND RIGHTS	0	121	0	0	0	0	0	121
99*5	AGENCY AND UTILITY AGREEMENTS	123	100	100	100	100	1000	0	1523
99*5	OTHER COSTS(INS,BOND AGENTS,ETC)	28	100	100	100	100	1442	0	1870
99*5	OUTSTANDING CLAIMS	0	0	0	0	0	3996	0	3996
99*5	PROJECT DEVELOPMENT	6250	5000	2750	2000	2000	2000	0	20000
99*5	PLANNING AND SA DVLPT.	1405	1608	1688	1772	1861	1954	0	10288
99*5	STA. AREA DEV.INFRASTR IMPVTS	0	1120	1046	1046	1047	1047	0	5306
99*6	IMPROVEMENT ALLOWANCE	3100	3100	3200	3300	3400	3500	0	19600
99*7	C-CAR START-UP	0	2000	0	0	0	0	0	2000
99*7	SPS JUSTIFIED PROJECTS-PH I	0	0	14000	0	0	0	0	14000
99*7	DALY CITY TURNBACK R E O'RUN	0	8000	0	0	0	0	0	8000
99*8	SPS PHASE II	0	0	0	0	0	0	4000	4000
	SUBTOTAL	21753	25819	24751	9318	11172	17309	5789	115911
	GRAND TOTAL	213446	245885	152371	19649	11172	17309	39577	699409

Figure 9

BART FIVE-YEAR UNFUNDED CAPITAL PROGRAM ($X1000)

FMS NO.	PROJECT NAME	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
	GROUP: FACILITIES, MAINLINE								
0-B-	EXTENSIONS R.O.W. ACQUISITION								
	PROGRAM YEAR AMOUNT	57372	0	0	0	0	0	0	57372
	UNFUNDED CASH FLOW	0	22867	34505	0	0	0	0	57372
11TD	SHOP FACILITIES - ODY								
	PROGRAM YEAR AMOUNT	4854	0	0	0	0	0	0	4854
	UNFUNDED CASH FLOW	0	386	4468	0	0	0	0	4854
99*1	SYSTEM SAFETY UPGRADE PH III REM								
	PROGRAM YEAR AMOUNT	0	5000	0	0	0	0	0	5000
	UNFUNDED CASH FLOW	0	0	0	5000	0	0	0	5000
	SUBTOTAL PROGRAM YEAR AMOUNT	62226	5000	0	0	0	0	0	67226
	SUBTOTAL UNFUNDED CASH FLOW	0	23253	38973	5000	0	0	0	67226
	GROUP: FACIL.,STATION & ACCESS								
01EE	492-SP PKG FACILITY-LMS(III)								
	PROGRAM YEAR AMOUNT	0	0	6485	0	0	0	0	6485
	UNFUNDED CASH FLOW	0	0	0	0	0	0	6485	6485
01GH	859-SP FRINGE PKG FACILITY-FVS								
	PROGRAM YEAR AMOUNT	0	0	10582	0	0	0	0	10582
	UNFUNDED CASH FLOW	0	0	0	0	0	1000	9582	10582
01MH	844-SP FRINGE PKG FACILITY BFS								
	PROGRAM YEAR AMOUNT	0	0	10809	0	0	0	0	10809
	UNFUNDED CASH FLOW	0	0	0	0	0	0	10809	10809
03E-	ACCESS IMPROVEMENTS ROCKRIDGE								
	PROGRAM YEAR AMOUNT	0	0	4000	0	0	0	0	4000
	UNFUNDED CASH FLOW	0	0	0	0	0	0	4000	4000
03HG	500-SP FRINGE PKG FACILITY-OR								
	PROGRAM YEAR AMOUNT	0	0	9023	0	0	0	0	9023
	UNFUNDED CASH FLOW	0	0	0	0	0	0	9023	9023
03JG	872-SP FRINGE PKG FACLTY-LAS(I)								
	PROGRAM YEAR AMOUNT	0	0	10654	0	0	0	0	10654
	UNFUNDED CASH FLOW	0	0	0	0	0	0	10654	10654
03LG	1265-SP FRINGE PKG FAC-WCS (I)								
	PROGRAM YEAR AMOUNT	0	14305	0	0	0	0	0	14305
	UNFUNDED CASH FLOW	0	0	0	0	0	1000	13305	14305
03NG	1200-SP REPLACEMENT PKG-PHS (I)								
	PROGRAM YEAR AMOUNT	0	20553	0	0	0	0	0	20553
	UNFUNDED CASH FLOW	0	0	9000	9553	2000	0	0	20553
03SH	1385-SP FRINGE PKG FACL-CDS (I)								
	PROGRAM YEAR AMOUNT	0	0	13808	0	0	0	0	13808
	UNFUNDED CASH FLOW	0	0	0	0	1000	0	12808	13808
041A	PK/RIDE LOT RAILROAD AVE-PTS								
	PROGRAM YEAR AMOUNT	0	526	0	0	0	0	0	526
	UNFUNDED CASH FLOW	0	270	256	0	0	0	0	526
05KH	1164-SP FRINGE PKG FACIL-CNS								
	PROGRAM YEAR AMOUNT	0	12532	0	0	0	0	0	12532
	UNFUNDED CASH FLOW	0	0	0	0	0	1000	11532	12532
07GH	912-SP FRINGE PKG FACILITY-MAS								
	PROGRAM YEAR AMOUNT	0	0	12140	0	0	0	0	12140
	UNFUNDED CASH FLOW	0	0	0	0	0	0	12140	12140

Figure 9

BART FIVE-YEAR UNFUNDED CAPITAL PROGRAM ($X1000)

FMS NO.	PROJECT NAME	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
	GROUP: FACIL., STATION & ACCESS								
11E4	1022-SP FRINGE PKG FACIL-PH I								
	PROGRAM YEAR AMOUNT	0	12177	0	0	0	0	0	12177
	UNFUNDED CASH FLOW	0	0	0	0	0	1000	11177	12177
15N-	PH IV SYSTEM ACCESSIBILITY IMPS								
	PROGRAM YEAR AMOUNT	0	0	420	0	0	0	0	420
	UNFUNDED CASH FLOW	0	0	0	0	0	0	420	420
	SUBTOTAL PROGRAM YEAR AMOUNT	0	60093	77921	0	0	0	0	138014
	SUBTOTAL UNFUNDED CASH FLOW	0	270	9256	9553	3000	4000	111935	138014
	GROUP: FACILITIES, SUPPORT								
01RM	EXPAND TRANSPORTATION BLDG-HAY								
	PROGRAM YEAR AMOUNT	265	0	0	0	0	0	0	265
	UNFUNDED CASH FLOW	100	165	0	0	0	0	0	265
03PH	EXPAND TRANSPORTATION BLDG-COY								
	PROGRAM YEAR AMOUNT	258	0	0	0	0	0	0	258
	UNFUNDED CASH FLOW	100	158	0	0	0	0	0	258
05NF	EXPAND TRANSPORTATION BLDG-RIY								
	PROGRAM YEAR AMOUNT	318	0	0	0	0	0	0	318
	UNFUNDED CASH FLOW	100	218	0	0	0	0	0	318
	SUBTOTAL PROGRAM YEAR AMOUNT	841	0	0	0	0	0	0	841
	SUBTOTAL UNFUNDED CASH FLOW	300	541	0	0	0	0	0	841
	GROUP: AFC & COMMUNICATIONS								
45CK	CUBIC GATE MODS - BAR/AC/ PASS								
	PROGRAM YEAR AMOUNT	0	670	0	0	0	0	0	670
	UNFUNDED CASH FLOW	0	670	0	0	0	0	0	670
473A	9 VENDORS & 8 ADDFARES/2D-GEN								
	PROGRAM YEAR AMOUNT	0	1320	0	0	0	0	0	1320
	UNFUNDED CASH FLOW	0	1320	0	0	0	0	0	1320
	SUBTOTAL PROGRAM YEAR AMOUNT	0	1990	0	0	0	0	0	1990
	SUBTOTAL UNFUNDED CASH FLOW	0	1990	0	0	0	0	0	1990
	GROUP: ELECTRIFICATION								
20HB	ADD'L STATION ESSENTIAL POWER								
	PROGRAM YEAR AMOUNT	0	1966	0	0	0	0	0	1966
	UNFUNDED CASH FLOW	0	756	1210	0	0	0	0	1966
	SUBTOTAL PROGRAM YEAR AMOUNT	0	1966	0	0	0	0	0	1965
	SUBTOTAL UNFUNDED CASH FLOW	0	756	1210	0	0	0	0	1966
	GROUP: PROCUREMENTS								
79--	REPL MAINT EQ 84/6								
	PROGRAM YEAR AMOUNT	400	0	0	0	0	0	0	400
	UNFUNDED CASH FLOW	0	0	400	0	0	0	0	400
79--	REPL MAINT EQ 86/8								
	PROGRAM YEAR AMOUNT	0	400	0	0	0	0	0	400
	UNFUNDED CASH FLOW	0	0	400	0	0	0	0	400

Figure 9

BART FIVE-YEAR UNFUNDED CAPITAL PROGRAM ($X1000)

FMS NO.	PROJECT NAME	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
	GROUP: PROCUREMENTS								
79--	REPL MAINT EQ 89/90								
	PROGRAM YEAR AMOUNT	0	400	0	0	0	0	0	400
	UNFUNDED CASH FLOW	0	0	200	200	0	0	0	400
798-	REPL OVERAGE SEDAN/MNT VEH (84/6								
	PROGRAM YEAR AMOUNT	0	2637	0	0	0	0	0	2637
	UNFUNDED CASH FLOW	0	0	2637	0	0	0	0	2637
798-	REPL OVERAGE SEDAN/MNT VEH 86/88								
	PROGRAM YEAR AMOUNT	0	1096	0	0	0	0	0	1096
	UNFUNDED CASH FLOW	0	0	1096	0	0	0	0	1096
793-	REPL OVERAGE SEDAN/MNT VEH (88/9								
	PROGRAM YEAR AMOUNT	0	0	370	0	0	0	0	370
	UNFUNDED CASH FLOW	0	0	370	0	0	0	0	370
	SUBTOTAL PROGRAM YEAR AMOUNT	400	4533	370	0	0	0	0	5303
	SUBTOTAL UNFUNDED CASH FLOW	0	0	5103	200	0	0	0	5303
	GRAND TOTAL PROGRAM YEAR AMOUNT	63467	73582	78291	0	0	0	0	215340
	GRAND TOTAL UNFUNDED CASH FLOW	300	26810	54542	14753	3000	4000	111935	215340

Figure 10

BART FIVE-YEAR FUNDED CASH FLOW BY SOURCE ($X1000)

				FISCAL YEAR				
FUND SOURCE	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
FEDERAL FUNDS								
UMTA SEC 3 80% MONEY (UMTA3)	29984	30212	20911	299	0	0	0	81406
UMTA SEC 3 75% MONEY (UMTAD)	34569	48338	28746	0	0	0	0	111653
UMTA SEC 9 BLOCK GRANT (UMTA9)	40785	25024	12506	6819	0	0	0	85134
FEDERAL AID INTERSTATE (FAI)	1644	6660	4373	0	0	0	0	12677
SUBTOTAL	106982	110234	66536	7118	0	0	0	290870
STATE FUNDS								
TP&D/SB-620 GUIDEWAY (GDWYT)	7407	14170	11328	60	0	0	0	32965
OTHER STATE (OTHER)	0	13	0	0	0	0	0	13
ART. XIX/PROP5 GUIDEWAY (GDWYA)	10853	5365	2434	1394	0	0	0	20046
SUBTOTAL	18260	19548	13762	1454	0	0	0	53024
REGIONAL FUNDS								
TDA	423	99	0	0	0	0	0	522
BRIDGE TOLLS (TOLLB)	8263	4503	2035	383	0	0	0	15184
STA	2037	923	214	0	0	0	0	3174
SUBTOTAL	10723	5525	2249	383	0	0	0	18880
BART FUNDS								
GENERAL CONSTRUCTION (OPERG)	11889	14397	6896	4109	5774	8313	100	51478
BASIC SYSTEM COMPLETION (OPERB)	228	867	491	0	0	0	0	1586
SYS. IMPROVEMENT RESERVE (OPERS)	2441	1244	208	307	0	0	0	4200
DLY CTY CONST. FUND ALL. (OPERA)	1318	597	138	0	0	0	0	2053
INTEREST TRANSF. FUND (OPERT)	1807	814	189	0	0	0	1789	4599
ROW ACQUS. AND EXT. PLN. (ROW/E)	4002	12406	344	128	0	0	148	17028
IMPROVEMENT ALLOWANCE (OPERI)	8492	6070	4456	3300	3400	3500	0	29218
OPERATING & UNKNOWN FUNDS(OPERO)	12012	844	1156	667	60	60	0	14799
MULTI YR CAPITAL ALLOCNS (OPREM)	2006	1960	3460	2047	1861	1954	0	13288
REV. BOND CONST. FUND (OPERC)	33286	71379	52486	136	77	3482	37540	198386
SUBTOTAL	77481	110578	69824	10694	11172	17309	39577	336635
GRAND TOTAL	213446	245885	152371	19649	11172	17309	39577	699409

Figure 11

BART FIVE-YEAR UNFUNDED CASH FLOW BY SOURCE ($X1000)

			FISCAL YEAR					
FUND SOURCE	PRIOR YRS	87/88	88/89	89/90	90/91	91/92	5+YRS	TOTAL
FEDERAL FUNDS								
UMTA SEC 3 75% MONEY (UMTA3)	0	386	4468	0	0	0	0	4854
UMTA SEC 9 BLOCK GRANT (UMTA9)	0	845	5259	160	800	3200	78794	89058
SUBTOTAL	0	1231	9727	160	800	3200	78794	93912
STATE FUNDS								
ART. XIX/PROPS GUIDEWAY (GDWYA)	0	4983	7517	0	0	0	0	12500
SUBTOTAL	0	4983	7517	0	0	0	0	12500
REGIONAL FUNDS								
BRIDGE TOLLS (TOLLB)	0	2549	4882	40	200	800	19698	28169
STA	0	23	37	0	0	0	0	60
SUBTOTAL	0	2572	4919	40	200	800	19698	28229
BART FUNDS								
OPERATING & UNKNOWN FUNDS(OPERC)	300	18024	32379	14553	2000	0	13443	80699
SUBTOTAL	300	18024	32379	14553	2000	0	13443	80699
GRAND TOTAL	300	26810	54542	14753	3000	4000	111935	215340

Figure 12

SUMMARY OF BART RESERVE CASH BALANCES

(Estimate in $000's for 1991)

	Line Item	Cumulative Total
Income & Reserves:		
Cash Balances (Est'd for June 30, 1987)		261,283
- General Construction (Fund 01)*	29,361	
- Basic System Completion (Fund 01)*	10,296	
- System Improvement Reserve	5,486	
- Revenue Bond Construction Fund	181,670	
- Vehicle Fire Hardening Reserve	180	
- Interest Transfer Fund	17,745	
- DC Overrun Reserve/Full Funding Agmt.	840	
- DC Construction Fund Allocation	521	
- Multi-Year Capital Allocations	3,126	
- Extensions Right-of-Way Reserve	4,260	
- Improvement Allowance	7,798	
Anticipated Interest		47,657
Capital Allocations from Operating Budget		25,383
Estimated Balance for Expenditures		334,323
Less:		
BART Obligations, Local Shares, and Costs Unavailable from Grant Sources, and Net Project Costs		(256,367)
Extensions		(70,000)
Equal:		
Contingency Funds (Balance)		
- DC Full Funding Grant Agreement		840
- Grant Contingency		7,116
Total		7,956

* Interest accrues to the Bond Fund and is available in the five year period; however, reserve balances do not change from year to year to reflect this since the interest does not actually accrue to the specific reserve.

(Continued from inside front cover)

BART FACTS
FISCAL YEAR 1986/1987 DATA
(JULY 1986 - JUNE 1987)

FARES

Regular Adult: Rail fares are largely based on a distance formula ranging from 80¢ to $3.00. The average weekday rail fare is currently $1.70. Regular express bus fares are 75¢ and $1.15 for one and two zone rides, respectively; rail patrons transferring to an express bus may obtain a free transfer worth 75¢.

Discounts: A maximum 6.25% rail fare discount is provided through the sale of $32 tickets for $30. Rail fares for handicapped persons, students 5-12 years of age, and persons 65 years of age and older are 10% of the regular adult fares. Children under 5 can ride free. Discount bus fares are 15¢ for one zone and 30¢ for two zones for the groups listed above. A $23 BART/MUNI monthly pass is also available, allowing for unlimited BART and San Francisco MUNI travel within San Francisco.

Transfers: Free transfers can be made between all BART trains. Special agreements between BART and most other Bay Area operators permit up to a 50% discount for connecting transit service (on a round-trip basis).

PATRONAGE

Average Weekday: BART patronage averaged 194,226 trips per weekday during FY 1986/87. Of these trips, 95,555 (48.9%) occurred within the 4-hour peak travel period (2 morning hours plus 2 afternoon hours). Transbay trips constitute 48.8% of weekday travel with 23.8% Eastbay and 27.4% Westbay.

Weekends: Saturday ridership averaged 81,411 trips with 46.6% Transbay, 27.7% Eastbay, and 25.7% Westbay. Ridership for Sunday averaged 48,366 with market shares of 46.6% Transbay, 29.5% Eastbay, and 23.9% Westbay.

Total Ridership: Rail ridership totaled 56,240,997 trips during FY 1986/87, 6.9% below a forecast of 60,422,200.

CAPACITY

On-Line Requirements: BART currently operates a maximum of 45 on-line trains which require 90 A-cars and 248 B-cars. In addition to these, 8 trains are held as ready spares requiring 16 A-cars and 24 B-cars.

Maximum Service Delivery: As of June 1987, scheduled peak hour capacity for the three Transbay routes serving downtown San Francisco and Oakland stations is 17 trains consisting of 159 cars (or 11,448 seats). For the Eastbay route, which also serves downtown Oakland stations, maximum peak hour capacity is 5 trains consisting of 24 cars (or 1,728 seats).

KEY PERFORMANCE INDICATORS

Train On-Time Performance: Daily on-time performance has consistently been above 90% since October 1980 and averaged 95.9% during FY 1986/87.

Scheduled Train Dispatches Completed: Performance has consistently been above 98% since January 1981 and averaged 99.2% during FY 1986/87.

Load Factors: Peak hour load factors during FY 1986/87 averaged 1.21 for Transbay service and 1.05 for the Eastbay route. Load factors for the shoulder period (approximately 45 minutes before and after the peak hour) averaged 1.09 Transbay and 0.96 for the Eastbay route. Maximum average load factors for offpeak service is 0.75 systemwide.

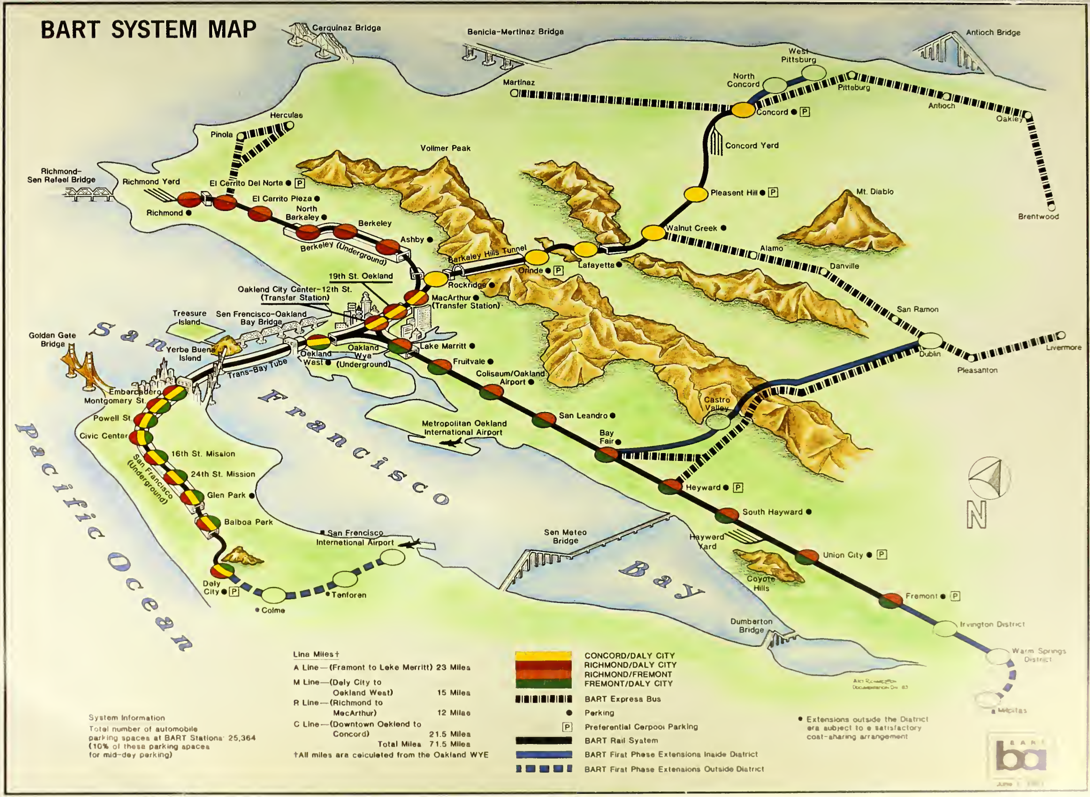
Peak Period Transbay Throughput: The percentage of scheduled Transbay capacity actually provided for FY 1986/87 is 97.9% for trains and 97.2% for cars.

OTHER PERFORMANCE DATA FOR FY 1986/87

PERFORMANCE DATA (1,000's)	
Total Passengers	56,241.0
Passenger-miles	695,944.3
Car-miles	30,266.6
Car-hours	1,110.9
Rail operating cost	$146,893.4
Express bus cost	$8,068.2
Transfer/Shuttle bus cost	$7,239.8
Total operating cost	$162,201.4
Net passenger revenue	$77,653.6
Other revenue	$6,970.3
Total revenue	$84,623.9
Operating deficit	$77,577.5

PERFORMANCE INDICATORS	
Farebox ratio	47.87%
Operating ratio	52.17%
Passenger-miles/seat-mile	31.94%
Rail operating cost/passenger-mile	21.11¢
Rail operating cost/passenger	$2.61
Total operating cost/passenger	$2.88
Total operating revenue/passenger	$1.50
Total operating deficit/passenger	$1.38
Rail operating cost/car-hour	$132.23
Rail operating cost/car-mile	$4.85
Passenger-miles/car-hour	626.47
Passenger trips/car-mile	1.86

BART SYSTEM MAP



Line Miles†

A Line—(Fremont to Lake Merritt)	23 Miles
M Line—(Daly City to Oakland West)	15 Miles
R Line—(Richmond to MacArthur)	12 Miles
C Line—(Downtown Oakland to Concord)	21.5 Miles
Total Miles	71.5 Miles

†All miles are calculated from the Oakland WYE

🟨 🟥 🟧 🟩	CONCORD/DALY CITY RICHMOND/DALY CITY RICHMOND/FREMONT FREMONT/DALY CITY
▮▮▮▮▮▮	BART Express Bus
●	Parking
P	Preferential Carpool Parking
▬	BART Rail System
▬	BART First Phase Extensions Inside District
■ ■ ■ ■	BART First Phase Extensions Outside District

System Information

Total number of automobile parking spaces at BART Stations: 25,364 (10% of these parking spaces for mid-day parking)

- Extensions outside the District are subject to a satisfactory cost-sharing arrangement

June 1, 1971

REG
516
58
1987-92
FINAL
VOL. 3

SF BAY AREA RAPID TRANSIT DISTRICT

[Short-Range Transit Plans]

1987 FIVE YEAR PLAN

1987-92

VOLUME III

APPENDICES

DOCUMENTS DEPT.
OCT 27 1987
SAN FRANCISCO
PUBLIC LIBRARY

AUGUST 1987

1987

BAY AREA RAPID TRANSIT DISTRICT

FIVE YEAR PLAN

FOR THE PERIOD JULY 1987 THROUGH JUNE 1992

The preparation of this report has been financed in part through a grant from the United States Department of Transportation, Urban Mass Transportation Administration under the Urban Mass Transportation Act of 1964, as amended, as passed through the Metropolitan Transportation Commission.

The contents of this report reflect the views of BART, which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the original views or policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation.

August 1987

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

BOARD OF DIRECTORS

Margaret K. Pryor
President

Barclay Simpson
Vice President

Robert S. Allen

Nello Bianco

John Glenn

John H. Kirkwood

Arthur J. Shartsis

Arlo H. Smith

Wilfred T. Ussery

Keith Bernard
General Manager

Department of Planning, Budget and Research
Bay Area Rapid Transit District
800 Madison Street
Oakland, California 94607

Volume III: **TABLE OF CONTENTS**

APPENDICES

A. BART Maintenance Program

B. BART Privatization Program
(To be provided following adoption by the BART Board of Directors)

C. BART E & H Program

APPENDIX A

BART MAINTENANCE PROGRAM

TABLE OF CONTENTS

Page

I. Introduction A-1

II. Maintenance A-1

III. Organization Breakdown A-4

IV. Major Maintenance Activities A-11

V. Support Departments A-23

VI. Attachments:

  1. Maris Description A-27

  2. Training Courses A-31

I. Introduction

BART presently operates a 72 mile heavy rail transit system with 440 revenue vehicles. In addition to maintenance of revenue vehicles, it must maintain all the support facilities which comprise the District. These include communication systems (radio and landline), automobiles, trucks, tracks, structures, subways, tunnels, power distribution systems (AC and DC), grounds, buildings, parking lots, fare collection equipment, computers, air distribution systems, pumps, lighting, etc. To accomplish these tasks, BART has developed an integrated maintenance program that provides for required maintenance and repair to be performed and documented.

The BART maintenance goal is to ensure that all equipment is properly maintained and modified as required, to maximize its performance and service life. This is accomplished by an established review process that ensures equipment is performing as planned, through a non-deferable preventative maintenance program and making repairs as required. These maintenance requirements are constantly monitored by Engineers and management to ensure that the appropriate work is being accomplished. To support these activities, BART documents performance and maintenance activities completely, so equipment performance can be analyzed regularly to identify undesirable trends before they become a problem. Encompassed within this plan are details of the maintenance organization, how responsibilities are divided, description of the level of effort for major systems and description of departmental interfaces that implement the BART maintenance program.

II. Maintenance Philosophy

Driving any maintenance program is the underlying philosophy by which an organization operates. Simply stated, BART's system is to have an engineered documented and managed program that will not be deferred. To implement this philosophy, the District has integrated a variety of other supporting philosophies to implement its maintenance plan.

A. Budget

The District is committed to properly financing maintenance. From the Board of Directors down, it receives priority attention. Last year the District committed approximately 40% of its operating funds to maintenance.

B. Engineering Support

The District divides its Engineering effort to ensure that maintenance receives appropriate support. At present 24 Engineers are dedicated to direct maintenance support, (12 revenue vehicle, 12 wayside and other systems). These Engineers work daily with Maintenance personnel to solve problems, analyze failures, develop maintenance procedures and implement changes.

In addition, an Engineering Department exists which supports many of the long-range activities and provides design support for projects as they are identified.

C. Preventative Maintenance

No maintenance program can be effective without a well designed and enforced preventative maintenance program. At BART, preventative maintenance will always be accomplished on time. Deferred preventative maintenance is not accepted. Preventative maintenance requirements are developed by Engineers in conjunction with Maintenance Management and performance is monitored to ensure adequacy. Changes are made as required to address a changing environment.

D. Reliability Tracking

Equipment reliability is the ultimate goal of all maintenance programs. To ensure that equipment is performing as planned, all relevant data about maintenance activities and equipment performance is entered into a computer. BART's Reliability Engineering Division primary function is to monitor and report performance parameters. Reports take the form of daily, weekly, and quarterly publications along with a variety of special reports that are intended to focus on special performance parameters. This reporting network ties all levels of management to a common performance criteria and keeps system performance in the forefront of daily activities.

E. Repairs

It is understood that failures will occur. Our maintenance philosophy is to be prepared to react to unscheduled maintenance as a matter of course with reasonable turnaround to keep the required amount of equipment available at all times. This philosophy has translated into one of the best car and wayside utilization records for rail transit in the country.

F. Modification

It is sometimes easy to look at a relatively small problem and think that a change is necessary to correct it by modification. BART's philosophy is that all things will fail at some rate. The overriding point is whether that rate significantly impacts operations. We endeavor to avoid expensive changes which have marginal return. Great effort is put into the concept that we "fix only what is broken" i.e., only change those things which will give a return on the investment or provide greater safety. Lesser failures must be worked on at fault tolerance level.

This means that available dollars or staff are focused to maximize our effectiveness. The management of this concept starts at the top with the Project Reveiw Board which oversees all District projects over $25,000 and ensures that proper focus and control is maintained.

G. Staffing

To support the maintenance program, BART has a skilled labor force that is trained to accomplish the required tasks. The staffing needs of each department are regularly reviewed to ensure that adequate staff is present to support all planned projects and required tasks. The District historically has not hesitated to add maintenance staff to respond to its needs. The success of our existing maintenance program has not made this requirement necessary in recent years. Since 1976 BART has increased the number of daily trains by 30% and the number of total car hours by 57%, but total direct maintenance staff has decreased by 12%.

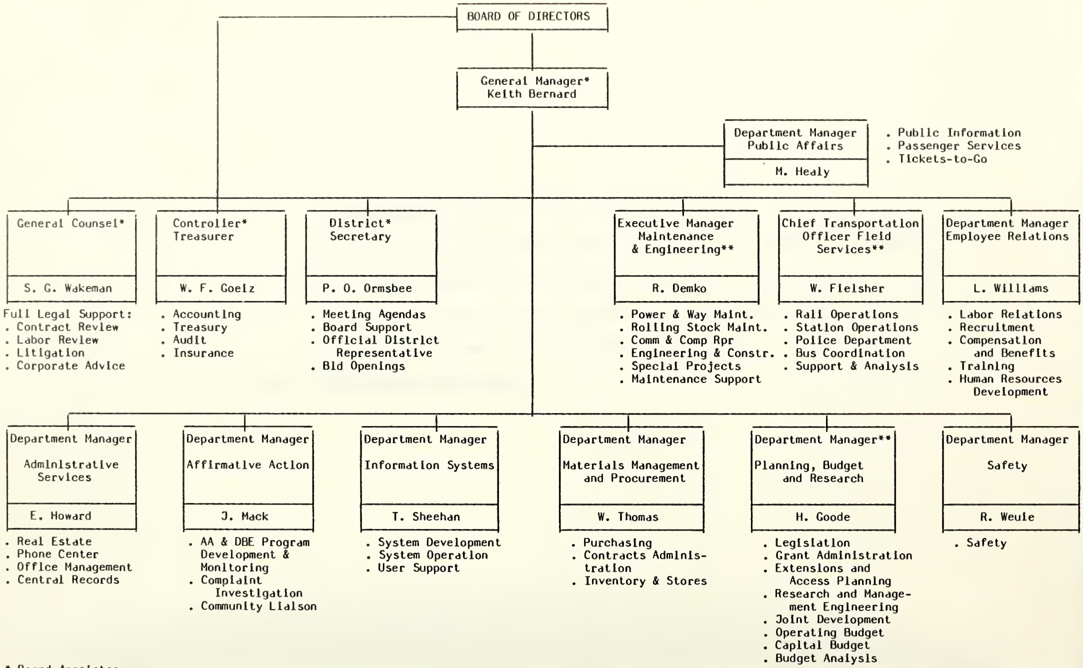
H. Training

The District has a comprehensive maintenance training program to ensure that skills are developed to an acceptable level. This includes a certification program for the Maintenance staff, and specific training for District personnel to advance their knowledge in areas required in the performance of their duties. A Technical Training staff of 16 people provide this service. In addition to Technical Training, BART also has a General Training Department which teaches a variety of courses to improve the administrative integrity of BART personnel. Additional amplification of the training program is provided as an attachment.

III. Organizational Breakdown

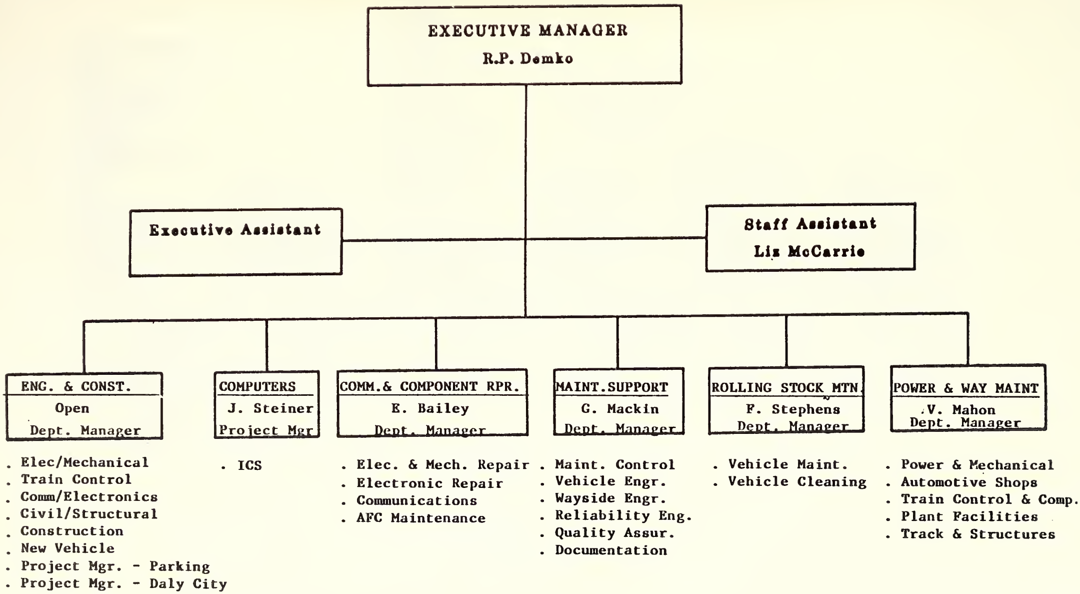
The Maintenance Departments and their primary support functions are combined within Maintenance & Engineering headed by R. P. Demko, Executive Manager, BART. The organizational charts in this section are designed to give a picture of how each is organized, staffed and its areas of responsibility.

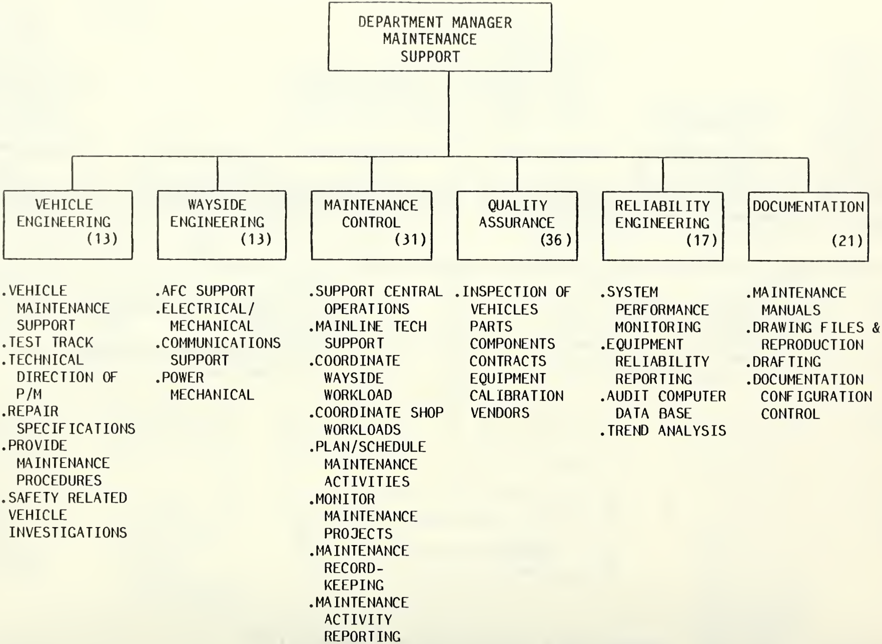
SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT



* Board Appointee
**Project Review Board

MAINTENANCE & ENGINEERING DEPARTMENT





VEHICLE ENGINEERING (13)

- .VEHICLE MAINTENANCE SUPPORT
- .TEST TRACK
- .TECHNICAL DIRECTION OF P/M
- .REPAIR SPECIFICATIONS
- .PROVIDE MAINTENANCE PROCEDURES
- .SAFETY RELATED VEHICLE INVESTIGATIONS

WAYSIDE ENGINEERING (13)

- .AFC SUPPORT
- .ELECTRICAL/ MECHANICAL
- .COMMUNICATIONS SUPPORT
- .POWER MECHANICAL

MAINTENANCE CONTROL (31)

- .SUPPORT CENTRAL OPERATIONS
- .MAINLINE TECH SUPPORT
- .COORDINATE WAYSIDE WORKLOAD
- .COORDINATE SHOP WORKLOADS
- .PLAN/SCHEDULE MAINTENANCE ACTIVITIES
- .MONITOR MAINTENANCE PROJECTS
- .MAINTENANCE RECORD-KEEPING
- .MAINTENANCE ACTIVITY REPORTING

QUALITY ASSURANCE (36)

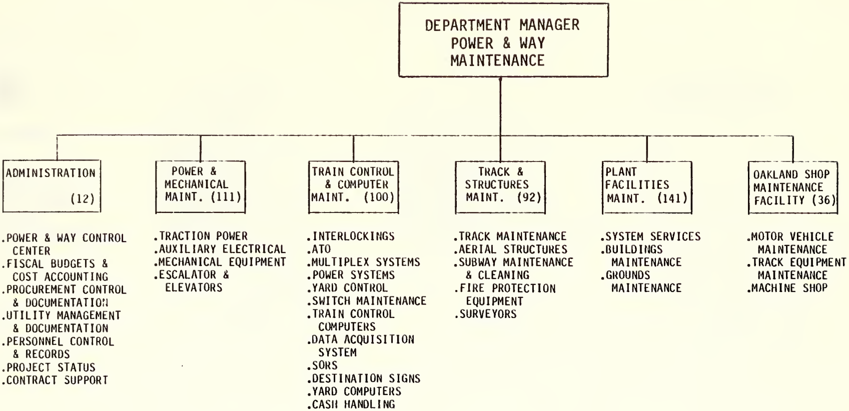
- .INSPECTION OF
  - VEHICLES
  - PARTS
  - COMPONENTS
  - CONTRACTS
  - EQUIPMENT
  - CALIBRATION
  - VENDORS

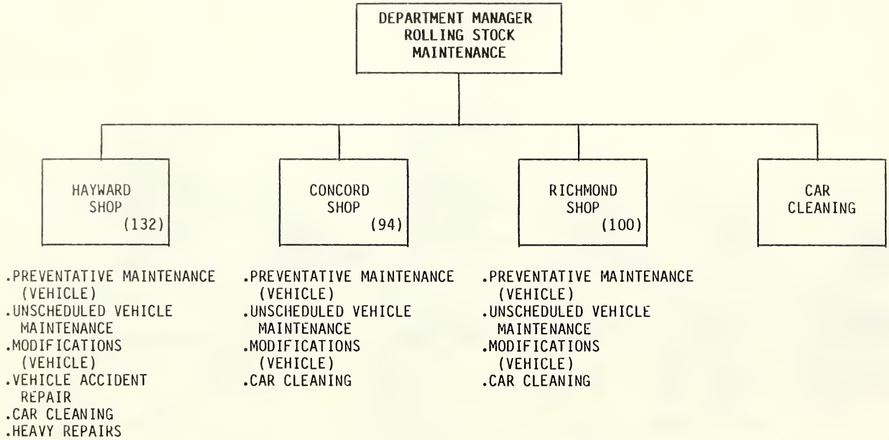
RELIABILITY ENGINEERING (17)

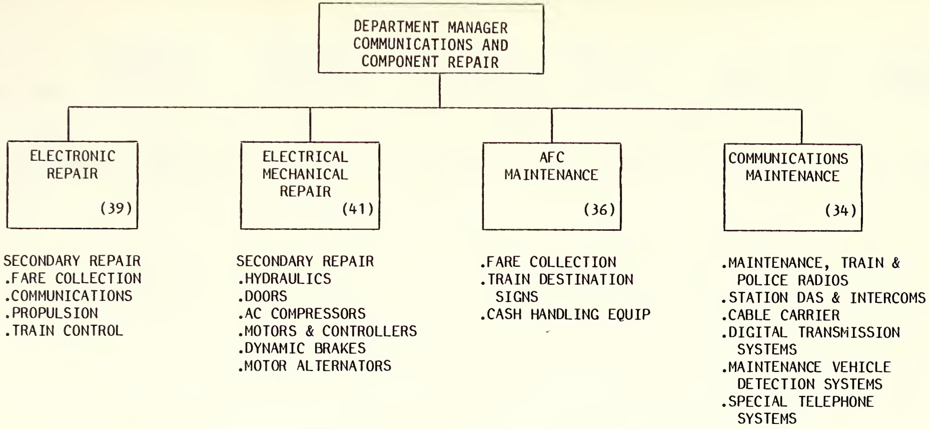
- .SYSTEM PERFORMANCE MONITORING
- .EQUIPMENT RELIABILITY REPORTING
- .AUDIT COMPUTER DATA BASE
- .TREND ANALYSIS

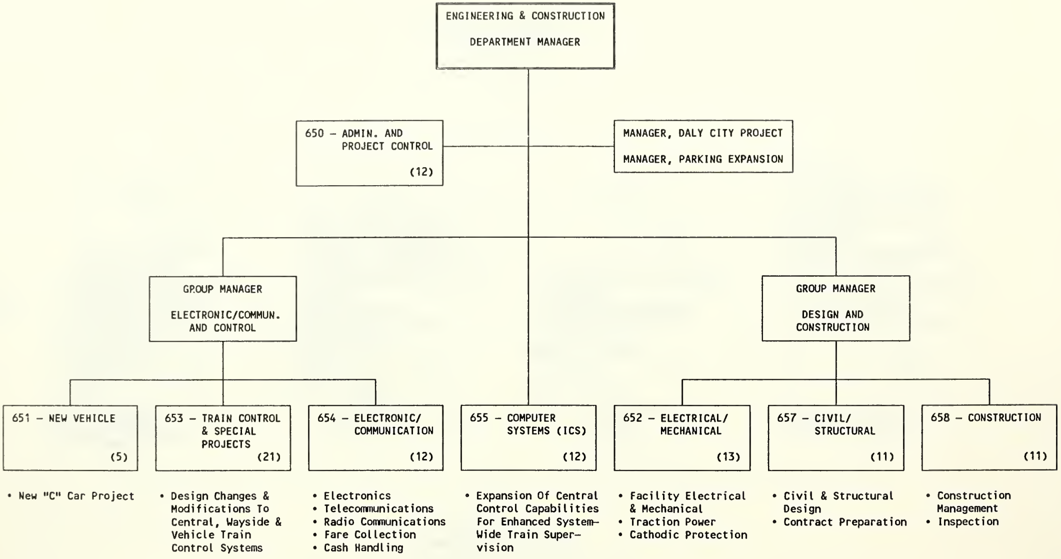
DOCUMENTATION (21)

- .MAINTENANCE MANUALS
- .DRAWING FILES & REPRODUCTION
- .DRAFTING
- .DOCUMENTATION CONFIGURATION CONTROL


DEPARTMENT MANAGER POWER & WAY MAINTENANCE
ADMINISTRATION (12)
.POWER & WAY CONTROL CENTER
.FISCAL BUDGETS & COST ACCOUNTING
.PROCUREMENT CONTROL & DOCUMENTATION
.UTILITY MANAGEMENT & DOCUMENTATION
.PERSONNEL CONTROL & RECORDS
.PROJECT STATUS
.CONTRACT SUPPORT
POWER & MECHANICAL MAINT. (111)
.TRACTION POWER
.AUXILIARY ELECTRICAL
.MECHANICAL EQUIPMENT
.ESCALATOR & ELEVATORS
TRAIN CONTROL & COMPUTER MAINT. (100)
.INTERLOCKINGS
.ATO
.MULTIPLEX SYSTEMS
.POWER SYSTEMS
.YARD CONTROL
.SWITCH MAINTENANCE
.TRAIN CONTROL COMPUTERS
.DATA ACQUISITION SYSTEM
.SORS
.DESTINATION SIGNS
.YARD COMPUTERS
.CASH HANDLING
TRACK & STRUCTURES MAINT. (92)
.TRACK MAINTENANCE
.AERIAL STRUCTURES
.SUBWAY MAINTENANCE & CLEANING
.FIRE PROTECTION EQUIPMENT
.SURVEYORS
PLANT FACILITIES MAINT. (141)
.SYSTEM SERVICES
.BUILDINGS MAINTENANCE
.GROUNDS MAINTENANCE
OAKLAND SHOP MAINTENANCE FACILITY (36)
.MOTOR VEHICLE MAINTENANCE
.TRACK EQUIPMENT MAINTENANCE
.MACHINE SHOP


DEPARTMENT MANAGER ROLLING STOCK MAINTENANCE
HAYWARD SHOP (132)
CONCORD SHOP (94)
RICHMOND SHOP (100)
CAR CLEANING
.PREVENTATIVE MAINTENANCE (VEHICLE)
.UNSCHEDULED VEHICLE MAINTENANCE
.MODIFICATIONS (VEHICLE)
.VEHICLE ACCIDENT REPAIR
.CAR CLEANING
.HEAVY REPAIRS
.PREVENTATIVE MAINTENANCE (VEHICLE)
.UNSCHEDULED VEHICLE MAINTENANCE
.MODIFICATIONS (VEHICLE)
.CAR CLEANING
.PREVENTATIVE MAINTENANCE (VEHICLE)
.UNSCHEDULED VEHICLE MAINTENANCE
.MODIFICATIONS (VEHICLE)
.CAR CLEANING


DEPARTMENT MANAGER COMMUNICATIONS AND COMPONENT REPAIR
ELECTRONIC REPAIR (39)
ELECTRICAL MECHANICAL REPAIR (41)
AFC MAINTENANCE (36)
COMMUNICATIONS MAINTENANCE (34)
SECONDARY REPAIR
.FARE COLLECTION
.COMMUNICATIONS
.PROPULSION
.TRAIN CONTROL
SECONDARY REPAIR
.HYDRAULICS
.DOORS
.AC COMPRESSORS
.MOTORS & CONTROLLERS
.DYNAMIC BRAKES
.MOTOR ALTERNATORS
.FARE COLLECTION
.TRAIN DESTINATION SIGNS
.CASH HANDLING EQUIP
.MAINTENANCE, TRAIN & POLICE RADIOS
.STATION DAS & INTERCOMS
.CABLE CARRIER
.DIGITAL TRANSMISSION SYSTEMS
.MAINTENANCE VEHICLE DETECTION SYSTEMS
.SPECIAL TELEPHONE SYSTEMS


ENGINEERING & CONSTRUCTION
DEPARTMENT MANAGER
650 – ADMIN. AND PROJECT CONTROL (12)
MANAGER, DALY CITY PROJECT
MANAGER, PARKING EXPANSION
GROUP MANAGER
ELECTRONIC/COMMUN. AND CONTROL
GROUP MANAGER
DESIGN AND CONSTRUCTION
651 – NEW VEHICLE (5)
653 – TRAIN CONTROL & SPECIAL PROJECTS (21)
654 – ELECTRONIC/ COMMUNICATION (12)
655 – COMPUTER SYSTEMS (ICS) (12)
652 – ELECTRICAL/ MECHANICAL (13)
657 – CIVIL/ STRUCTURAL (11)
658 – CONSTRUCTION (11)
• New "C" Car Project
• Design Changes & Modifications To Central, Wayside & Vehicle Train Control Systems
• Electronics
• Telecommunications
• Radio Communications
• Fare Collection
• Cash Handling
• Expansion Of Central Control Capabilities For Enhanced System-Wide Train Supervision
• Facility Electrical & Mechanical
• Traction Power
• Cathodic Protection
• Civil & Structural Design
• Contract Preparation
• Construction Management
• Inspection

(5YR_ORG.frm) Rev. 05-28-1987

IV. Major Maintenance Activities

To describe the level of effort given to maintenance and provide a picture of the complexity of the maintenance program at BART the following tables were prepared for major maintenance activities.

MAJOR SYSTEMS AND MAINTENANCE ACTIVITIES

DESCRIPTION	ACTIVITY	AMOUNT	FREQUENCY	WORK LOCATION	ESTIMATED M/HRS/YR
ROLLING STOCK MAINT.	Vehicle PM	440 Cars	450 Hrs.	All Shops	83,200
Revenue Vehicle	Veh. Unsch. Maint.	"	As Failed	All Shops	280,452
	Veh. Accd. Repair	"	As Required	Hayward Shop	3,000
	Veh. Vandalism	"	As Required	All Shops	10,000
	Veh. Modification	"	As Scheduled	All Shops	17,500
	Car Cleaning	"	Daily	All Yards	47,800
	Heavy Repair	"	As Required	Hayward Shops	39,028
COMM. & COMP. REPAIR					TOTAL 478,980
ATO Vehicle	PM	342	Annually	ERS-Hayward	2,100
Component Maint.	Unsch. Maintenance	1,648	As Required	ERS-Hayward	8,200
ATC - Wayside	PM	2,330	Annually	ERS-Hayward	6,600
Comp. Maintenance	Unsch. Maintenance	2,019	As Required	ERS-Hayward	11,500
Communication Equip.	PM	915	Annually	ERS-Hayward	1,300
Components	Unsch. Maintenance	1,728	As Required	ERS-Hayward	14,500
Vehicle Propulsion	PM	112	Annually	ERS-Hayward	800
Components	Unsch. Maint.	3,699	As Required	ERS-Hayward	12,500
Hyd.					
	Unsch. Maint.	4,070	As Required	ERS-Hayward	17,400

DESCRIPTION	ACTIVITY	AMOUNT	FREQUENCY	WORK LOCATION	ESTIMATED M/HRS/YR
Door & Misc. Hardware					
Repair for RV	Unsch. Maint.	340	As Required	EMRS-Hayward	2,400
Elec. Mech. Comp.					
from Revenue Vehicle	Unsch. Maint.	8,609	As Required	EMRS-Hayward	43,400
	Mods. & Updates	303	As Required	EMRS-Hayward	3,800
	Spec. Proj. & Ser.	761	As Required	EMRS-Hayward	1,200
A/C Comp. Repair, RV	Unsch. Maint.	407	As Required	EMRS-Hayward	11,100
Supervisory Control	PM	237	Mo/Qtr/Semi	Systemwide	2,868
Systems (DTS, MVDD,					
Recorders, Modems)	Repair	-	As Required	Systemwide	1,680
Radio Systems	PM	350	Annual	Systemwide	1,600
(Train, Maint.,					
Yard, Police)	Repair	-	As Required	Systemwide	4,724
Station Comm.	PM	105	Mo/Qtr/Semi	Systemwide	800
(PA, ICS, Monitors)	Repair	-	As Required	Systemwide	7,388
Telephone Systems	PM	140	Mo/Qtr/Semi	Systemwide	2,469
(Maint,Emerg,Other)	Repair	-	As Required	Systemwide	2,184

DESCRIPTION	ACTIVITY	AMOUNT	FREQUENCY	WORK LOCATION	ESTIMATED M/HRS/YR
Carrier & Wayside	PM	63	Mo/Qtr/Semi	Systemwide	2,742
(Cable Plant					
Carriers)	Repair	-	As Required	Systemwide	2,782
AFC MAINT (Incl. Comp. for Tic. Vend. Gates, Addfare, Changers, etc)	PM	868	Annually	ERS-Hayward	3,500
	Unsch. Maintenance	2,128	As Required	ERS-Hayward	13,000
	Acceptance Testing	2,000	As Required	ERS-Hayward	500
ATO Veh. Comp. Maint.	PM	342	Annually	ERS-Hayward	2,100
	Unsch. Maint.	1,648	As Required	ERS-Hayward	8,200
ATC Wysd Comp. Maint.	PM	2,330	Annually	ERS-Hayward	6,600
	Unsch. Maint.	2,019	As Required	ERS-Hayward	11,500
Comm. Comp. Maint.	PM	915	Annually	ERS-Hayward	1,300
	Unsch. Maint.	1,728	As Required	ERS-Hayward	14,500
Vehicle Prop.	PM	112	Annually	ERS-Hayward	800
Component Maint.	Unsch. Maint.	3,699	As Required	ERS-Hayward	12,500
Destination Signs	PM	284	Quarterly	All Stations	2,840
	Repair		As Required	All Stations	1,200

DESCRIPTION	ACTIVITY	AMOUNT	FREQUENCY	WORK LOCATION	ESTIMATED M/HRS/YR
POWER & WAY MAINTENANCE Power & Mechanical Maint. Div.					
Power Facilities	PM	64 facilities 150 mile rail and transmission cable	Dly/Wky/Mo/Qtr/ Semi-Ann/Annually	System-wide	49,878
	Repair				14,068
Elec. Auxiliary	PM	42 facilities	Mo/Qtrly/ Semi-Ann/Annually	System-wide	27,076
	Repair				19,455
Mech. Auxiliary	PM	42 facilities	Mo/Qtrly/ Semi-Ann/Annually	System-wide	26,683
	Repair				18,807
Elevator/Escalator	PM	134EEscalators 64 Elevators	Wkly/Mo/Qtrly/ Semi-Ann/Annually	System-wide	19,107 15,637
					177,711

DESCRIPTION	ACTIVITY	AMOUNT	FREQUENCY	WORK LOCATION	ESTIMATED M/HRS/YR
Oakland Shop Maint. Facility Div.					
Sedans	Unsch. Repair	97	As required	O K S	4,424
	PM		6000 mi.	O K S	3,620
Lt.Trucks	Unsch. Repair	128	As required	O K S	5,865
	PM		6000 mi.	O K S	4,778
Heavy Equip.	Unsch. Repair	104	As required	O K S	11,225
	PM		30 days - 100 Hrs.	O K S	7.483
Portable Equip.	Unsch. Repair	123	As required	O K S & system wide	1,248
	PM		30 - 90 days	O K S & system wide	877

MACHINE-FABRICATION SHOP:

District Equipment	Modification Fabrication	260	As required	O K S	2,080
District Equipment	Repairs	780	As required	O K S	4,160

DESCRIPTION	ACTIVITY	AMOUNT	FREQUENCY	WORK LOCATION	ESTIMATED M/HRS/YR
Train Control & Computer Maint. Div.					
YARD CONTROL	PM	172	DLY/WK/MO/SEMI-AN/AN	YARDS	9,946
SYSTEM	UNSCH.	172	AS REQUIRED	YARDS	4,119
T/C RM INSPECT	PM	41	WEEKLY	SYSTEM WIDE	6,102
ROUTE PROHIBITS	AS REQUIRED				
	AS REQUIRED	26	DAILY	SYSTEM WIDE	3,200
ENG. MODS	UNSCH.	38	AS REQUIRED	SYSTEM WIDE	720
DISPLAY BOARD	PM	1	MO.	SYSTEM WIDE	2,600
	UNSCHED.	1	AS REQUIRED	SYSTEM WIDE	6,160
SOR	PM	70	MO.	SYSTEM WIDE	2,940
	UNSCH.	70	AS REQUIRED	SYSTEM WIDE	1,260
DAS	PM	36	MO.	SYSTEM WIDE	3,200
	UNSCH.	36	AS REQUIRED	SYSTEM WIDE	1,900

DESCRIPTION	ACTIVITY	AMOUNT	FREQUENCY	WORK LOCATION	ESTIMATED M/HRS/YR
DSS	PM	40	MO.	SYSTEM WIDE	3,360
	UNSCH.	40	AS REQUIRED	SYSTEM WIDE	1,440
TRAIN CONTROL COMPUTER SYS.	PM	3	DAY/MO.	LMA	3,850
	UNSCH.	3	AS REQUIRED	LMA	1,650
YARD COMPUTER	PM	3	MO.	YARDS	2,400
	UNSCH.	3	AS REQUIRED	YARDS	900
ENG. MOD	UNSCH.	38	AS REQUIRED	SYSTEM WIDE	700

* DOES NOT INCLUDE NEW SW FOR KE.

DESCRIPTION	ACTIVITY	AMOUNT	FREQUENCY	WORK LOCATION	ESTIMATED M/HRS/YR
WAYSIDE MUX	PM	1750	ANNUAL	SYSTEM WIDE	10,879
	UNSCH. REPAIR	1750	AS REQUIRED	SYSTEM WIDE	4,517
STATION MUX	PM	89	QTRLY	SYSTEM WIDE	1,657
	UNSCH.	89	AS REQUIRED	SYSTEM WIDE	685
MAINT. ATO/ATC	PM	91	MONTHLY	SYSTEM WIDE	2,644
	UNSCH.	91	AS REQUIRED	SYSTEM WIDE	1,092
INTERLOCKING SYSTEM	PM	38	BI-ANNUAL	SYSTEM WIDE	7,532
	UNSCH.	38	AS REQUIRED	SYSTEM WIDE	3,122
SWITCH MACHINES	PM	367	DLY/MO/QTR/SEMI-ANN.	SYSTEM WIDE	12,500
	UNSCH.	367	AS REQUIRED	SYSTEM WIDE	7,395
POWER SYSTEMS	PM	139	WK/MO/BI-MOTHLY	SYSTEM WIDE	4,527

DESCRIPTION	ACTIVITY	AMOUNT	FREQUENCY	WORK LOCATION	ESTIMATED M/HRS/YR
Plant Facilities Maint. Div.					
System Service					
A-Line	Scheduled Maint.	9	Daily	Stations	24,960
R-Line	" "	6	"	"	20,800
M-Line	" "	8	"	"	37,440
C/K-Lines	" "	7	"	"	22,880
Shops/Bldgs.	" "	10	"	Systemwide	33,280
Supply	Deliver Supplies	44	"	"	2,080
					141,440
Painters					
Paint	Scheduled Projects	25	Daily	Systemwide	14,560
					14,560
Bldg. Maint. & Repair					
Locksmithing	P.M.	44	Daily	Systemwide	4,160
A-Line	P.M.	15	"	"	4,160
R/K-Lines	P.M.	9	"	"	4,160
M-Line	P.M.	10	"	"	4,160
C-Line	P.M.	8	"	"	4,160
Projects	Scheduled Projects	44	"	"	8,320
					29,120
Grounds					
A-Line	P.M.	10	Daily	Stations/Bldgs	18,720
R/C-Lines	P.M.	12	"	" "	16,640
M-Line	P.M.	5	"	Stations	4,160
Irrigation	P.M.	32	"	Stations/Bldgs	6,240
Truck/Tractor	P.M.	32	"	" "	4,160
Roving Crew	Wayside/Unscheduled Maintenance	32	"	Wayside/Stations/ Bldgs	8,320
					58,240

P&WM 6/8/84

DESCRIPTION	ACTIVITY	(MILES) AMOUNT	FREQUENCY	WORK LOCATION	ESTMAATED M/HRS/YR
Track & Structures Maint. Div.					
Track Inspection	P.M.	150	DAILY	SYSTEMWIDE	16640
BOLT TORQUING	P.M.	150	DAILY	SYSTEMWIDE	12480
TRACK SURFACE/GAGING	P.M.	150	DAILY	SYSTEMWIDE	12480
RUST PREVENTION	P.M.	150	DAILY	SYSTEMWIDE	8320
SPENO RAIL GRINDING	P.M.	150	DAILY	SYSTEMWIDE	6240
in house support	support	150	AS REQUIRED	SYSTEMWIDE	4160*
CONTRACTOR SUPPORT	SUPPORT	150	AS REQUIRED	SYSTEMWIDE	8320
CLEAN,LUBE,GRIND,SWITCHES	P.M.	YARD/INTERLOCKINGS	DAILY	SYSTEMWIDE	4160

DESCRIPTION	ACTIVITY	AMOUNT	FREQUENCY	WORK LOCATION	ESTMAATED M/HRS/YR
WATER CONTROL	PREVENTATIVE		DAILY	SYSTEMWIDE	
(a) Aerial		48.0	Daily	Systemwide	4160
(b) Grade	Maintenance	54.0	Daily	Systemwide	10400
(c) Sub Station		40.0	Daily		4160
Chemical Grouting (Sub Structures)	Preventive Maintenance	40.0	As Required	Systemwide	4160
INVERT CLEANING	ROUTINE	150	DAILY	SYSTEMWIDE	8320
Vent Cleaning	Maintenance				
TRACKWAY SIGNS	ROUTINE MAINTENANCE	150	As Required	SYSTEMWIDE	10400
SUPPORT	SCHEDULED AND UNSCHEDULED	150	As Required	SYSTEMWIDE	4160
WELDERS	ROUTINE MAINTENANCE	150	DAILY	SYSTEMWIDE	8320
INSPECTION	ROUTINE MAINTENANCE	150	DAILY	SYSTEMWIDE	4160

DESCRIPTION	ACTIVITY	AMOUNT	FREQUENCY	WORK LOCATION	ESTMAATED M/HRS/YR
UNSCHEDULED MAINTENANCE	NON ROUTINE		DAILY	SYSTEMWIDE	4160
SURVEY	P.M./SUPPORT	150 Miles R/W	DAILY	SYSTEMWIDE	8320
FIRE SERVICES	P.M./EVO's	SYSTEMWIDE BLDGS., STATIONS & TRACKWAY	DAILY	SYSTEMWIDE	41600

V. Support Departments

Embodied within any maintenance organization are those services provided by non-maintenance departments that support the program.

Obviously, there are a number of administrative activities that keep an organization going (i.e. Accounting, Employee Relations, Budget, Safety) which will not be discussed in this plan, but there are activities which have a more direct connection to a maintenance plan and serve to implement the process.

Field Services

The following describes Field Services activities which support/ interface with BART's maintenance program:

A. Car Failures

Train operators report mainline train failures annunciated on their operator's console and/or those that are obviously affecting their train's performance, to BART Central. Central and the Vehicle Maintenance Supervisor analyze the problem(s) and advise the Train Operator how he/she can either correct or alleviate the problem or they arrange for the Mainline Electronic Technician (ET) to board the train and correct/monitor the failure. Some problems are corrected temporarily through the use of the system cut-outs on the car control panel. When the train lays up in the yard, the failure is reported by type and car number to the Tower Supervisor who in turn reports them to Maintenance Control. The bad order car is uncoupled from all others and delivered to the location requested by Maintenance.

B. Train Wash

Train Operations' goal is to cycle 300 cars per yard per week through the car washers.

C. Public Address/Intercom Failure Detection

Train Operations has a program for detecting and reporting bad order train public address and intercom systems. This task requires the services of two (2) Train Operators, and is performed at a time when there is little or no other yard requirements. Inoperative equipment is reported to Maintenance Control.

D. Station Operations
AFC or Transfer Machine Equipment Failures

Fingertip maintenance by Agents involve clearing ticket and money jams. No outside help is required for this task.

Machine mechanical failures require an Agent to complete the System & Equipment Incident Report (S.E.I.R.) followed by a phone report to AFC Maintenance in Hayward.

All other equipment failures (elevator/escalators) and buildings and grounds discrepancies are reported on Maintenance Forms by the Agent. The completed form must be followed up by a phone report to the Power and Way Maintenance Control Center.

Information Systems

Information Systems provides essential support and direct interface to BART's maintenance program primarily through the Maintenance and Reliability Information System (MARIS).

At the present time MARIS enhances the tracking and maintainability of BART's transit vehicles and wayside equipment by providing the following services:

1. Tracks fleet status which relates to transit vehicle availability and provides train consist information.
2. Reports failure and reliability statistics which aid in determining appropriate time intervals for preventative maintenance.
3. Aids in scheduling and expediting repairs and preventative maintenance of transit vehicles and wayside equipment.
4. Gives diagnostic aid and pre-staging assistance for maintenance functions by furnishing related transit vehicle history, including a list of tracked maintenance and modified items.
5. For the secondary repair shops, tracks components through the repair cycle to expedite repair by priority of need and to aid in implementing modifications.
6. Identifies components which may need engineering attention.
7. Furnishes BART management with failure trend data and exception reports to assist in improving maintainability of transit vehicles and wayside equipment.

MARIS is in the process of being expanded to accommodate processing of data for the new C-cars with special emphasis upon warranty. Capability will be added for tracking vehicle and wayside components which are subject to measured time change-out.

Training

The BART Training Division (a part of the Employee Relations Department) provides classroom and hands-on training services to all maintenance departments/divisions upon request.

Routine and certification training is provided to Rolling Stocks Maintenance, Train Control, Computer Maintenance, Communicatons and A.F.C., Power and Support Electrical Maintenance, Track and Structures and Buildings and Grounds.

Training works closely with Vehicle Engineering and Documentation to assure that technical subject matter taught in the classes is current and accurate.

Training will be conducting classes on the C-car and consequently is working very closely with Design Engineering to assure that all relevant topics are taught satisfactorily.

Training is also involved in documentating and developing a training class for the "KE" track.

Provided as an attachment is a list of training courses taught by this department in support of maintenance.

Material Management and Procurement

Performs the logistical functions of the District. The scope of District logistical functions ranges from material planning through all phases of procurement, custody, distribution and control procedures. Typical functions performed for maintenance departments by the Purchasing section are:

1. Vehicle Engineering: Review and comment on specification workability; assist with procedure definitions; resolve Quality Assurance exceptions with vendors; coordinates project communications with vendors; purchase and expedite materials and services; develops alternate sources.
2. Direct maintenance (RSM, C&CR, P&W): Purchase and expedite materials and services; negotiate adjustments with vendors and secure information from the market place.
3. Maintenance Planning: Supply information on availabilities and lead times plus some expediting.

Typical functions performed for maintenance departments by Contract Management division are:

1. Vehicle Engineering: Development of commercial and technical specifications; bidding and contract administration.
2. Direct maintenance (RSM, C&CR, P&W): Procurement of plant and capital equipment. Development of repair contracts; bid and contract administration.
3. Maintenance Planning: Participates in planning for capital spares.

Typical functions performed for maintenance departments by Material Administration section are:

1. Vehicle Engineering: Makes up and stocks parts kits for modifications; provides usage history on parts; puts new items in stock; holds materials in custody, transports, issues and receives as required.

2. Direct maintenance (RS&R, C&CR, P&W): Maintains maintenance parts inventory; issues, receives, transports and distributes material and equipment; scraps spent supplies and equipment for repair operations and outside repair contract; backorders and reorders parts; prepares parts status lists; assembles and issues modification kits.

3. Maintenance Planning: Prepares parts status reports and usage reports; input Maintenance Monthly Plan.

Planning and Analysis

The Planning Division of the Planning and Analysis Department is responsible for financing the BART capital program and its presentation to MTC for incorporation into the Regional Transportation Plan. The Planning Division provides documentation required by the MTC/UMTA grant review process and provides necessary liaison between BART and outside agencies leading up to the point where project funding is assured.

The Research section works with Field Services to define future train service levels. This information is then translated into car mile and car hour estimates which are the basis for vehicle maintenance planning. The Research section also prepares the Quarterly Performance Report (QPR) which summarizes progress toward all District objectives, including maintenance objectives dealing with car availability. AFC equpment availability and elevator and escalator availability.

VI. ATTACHMENTS

MAINTENANCE AND RELIABILITY
INFORMATION SYSTEM

(Expansion)

Attachment #1

MAINTENANCE AND RELIABILITY INFORMATION SYSTEM

INTRODUCTION

The Maintenance and Reliability Information System (MARIS) is a module of BART's overall computerized management information system.

INTRODUCTION TO MARIS

MARIS is a CRT menu-driven system with optional hard copy printing capabilities at most of the terminal locations. There are eight (8) primary user groups:

- Trouble Desk
- Maintenance Control
- Vehicle Maintenance
- Wayside Maintenance
- Secondary Repair
- Transportation Towers
- Reliability Engineering
- Vehicle Maintenance Engineering

MARIS provides data to assist in maintaining reliable transit vehicles and wayside support equipment, as well as providing on-line data to assist management. MARIS terminals are located in:

- Three Vehicle Shops
- Three Yard Towers
- Vehicle Maintenance Engineering
- Maintenance Control (Hayward Main Shop)
- Central Operations
- Wayside Maintenance Shops
- Reliability Engineering and
- Secondary Maintenance

Regular users of MARIS information include:

- Maintenance Control Schedulers
- Shop Foremen
- Shop Superintendents
- Reliability Engineering and Quality Assurance Staff
- Engineering Design and Support Staff
- Maintenance and Engineering Management
- Field Services Personnel
- Planning and Research Staff
- APTA's Trip Program Participants
- Safety Personnel
- Legal Staff
- Materials Management Personnel

MARIS AT THE PRESENT TIME

The existing system was developed to enhance the tracking and maintainability of BART's transit vehicles and wayside equipment by providing the following services:

(a) Tracks fleet status which relates to transit vehicle availability and provides train consist information.

(b) Reports failure and reliability statistics which aid in determining appropriate time intervals for preventative maintenance.

(c) Aids in scheduling and expediting repairs and preventative maintenance of transit vehicles and wayside equipment.

(d) Gives diagnostic aid and pre-staging assistance for maintenance functions by furnishing related transit vehicle history, including a list of deferred maintenance and modified items.

(e) For the secondary repair shops, tracks components through the repair cycle to expedite repair by priority of need and to aid in implementing modifications.

(f) Identifies components which may need engineering changes.

(g) Participates in industry related reliability and failure analysis (e.g., APTA's TRIP).

(h) Furnishes BART management with failure trend data and exception reports to assist in improving maintainability of transit vehicles and wayside equipment.

MARIS IS DIVIDED INTO SIX FUNCTIONAL AREAS:

(a) Consist Tracking

- Status and location of consists and the transit vehicles they contain

- Collection of consist failure and history data

(b) Transit Vehicle Tracking

- Status and location of transit vehicles
- Collection of reliability and failure data
- Incident tracking and reporting
- Failure and repair history

(c) Transit Vehicle Maintenance

- Status of the maintenance being performed on a transit vehicle
- Daily and weekly input on maintenance workload and scheduling

(d) Wayside Equipment Maintenance

- Status and location of wayside equipment
- Daily and weekly input on maintenance workload and scheduling

(e) Secondary Repair

- Status and location of repairable parts
- Daily and weekly input on maintenance workload and scheduling
- Repairable item tracking
- Control over repairable and consumable parts
- Component reliability analysis

(f) PM Scheduling Support

- Daily and weekly input and update on workloads and scheduling of transit vehicles and wayside equipment maintenance
- Maintenance planning and management
- Planning and scheduling of routine maintenance in primary and secondary shops

The software for MARIS consists of a mixture of on-line, interactive programs and batch programs. Data for the system resides in a mix of on-line and batch data bases and magnetic tape archive files.

There are four groups of DL/I data bases which address:

- Consists
- Transit vehicles
- Wayside equipment
- Components

PLANNED CHANGES AND ENHANCEMENTS TO MARIS

The District has ordered 150 new transit vehicles of a different kind than those in the present fleet. The new cars have been designated Type "C" cars as opposed to the existing "A" and "B" types of cars.

MARIS must accommodate the processing of data for the new cars in the following areas:

- o Warranty Management
- o Time Control Management
- o New functions such as split train and component verification

New software must be developed to handle these areas. New data bases will be required for some of these areas of development. Approximately, twelve existing MARIS programs will require modification to handle "C" car data.

This system expansion also calls for extending data base maintenance capability, and changing segment access methodology for equipment history functions from first in, first out (FIFO) to last in, first out (LIFO).

MARIS services a great variety of needs. The computer application system aspect of MARIS of necessity is complex. At the present time, there are more than 45 basic functions (e.g., Fleet Status, Vehicle Status). In addition many of the functions have several options. More functions will be added as part of the MARIS Expansion Project.

MAINTENANCE TRAINING

COURSE DESCRIPTIONS

D. COMMUNICATION ELECTRONIC TECHNICIANS (CET's)

TITLE: 1. TRAIN RADIO

OVERALL OBJECTIVES: To assure that Communications Electronic Technicians (CET's) maintain an acceptable level of knowledge in the proper maintenance and repair of Train Radio Communication Systems.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids and some hands-on application.

EXAMINATION: Written examinations covering the Train Radio System, its functions and troubleshooting.

TARGET AUDIENCE: Communications Electronics Technicians (CET's) assigned to the Communications Section.

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. Train Radio Base Sections and all associated equipment
2. Station Antennas and Feed Arrangements
3. TCC (Train Control Console) at Central
4. Console Support Equipment at LMA Toll Test Board RR #2
5. Radio Test Equipment
6. Keying Systems
7. System Troubleshooting
8. Module Adjustment
9. Adjustment of Base Station Transmitter
10. FCC Documentation
11. Safety Procedures
12. Clearance Procedures
13. Audio Adjustments

COURSE LENGTH: Forty (40) Hours (May be taught in full length or modular form)

TITLE: 2. MAIN DISTRIBUTOR FRAME

OVERALL OBJECTIVES: To assure that Communications Electronic Technicians (CET's) maintain an acceptable level of knowledge in the proper maintenance and repair of the Main Distributor Frame and its functions.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids and some hands-on application on the Main Distributor Frame at the Lake Merritt Toll Test Board.

EXAMINATION: Written examinations covering the Main Distributor Frame, its functions and troubleshooting.

TARGET AUDIENCE: Communications Electronics Technicians (CET's) assigned to the Communications Section.

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. Quality Control Standards with Regard to the Main Distributor Frame
2. Main Distributor Frame Documentation
3. System Security
4. Clearance Required
5. Carrier Voltage Considerations

COURSE LENGTH: Four (4) Hours

TITLE:	3. BART TELEPHONE SYSTEM
OVERALL OBJECTIVES:	To assure that Communications Electronic Technicians (CET's) maintain an acceptable level of knowledge in the proper maintenance and repair of the BART Telephone System.
COURSE FORMAT:	Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids and some hands-on application.
EXAMINATION:	Written examinations covering BART's Telephone System, its functions and troubleshooting.
TARGET AUDIENCE:	Communications Electronics Technicians (CET's) assigned to the Communications Section.
CYCLE:	Upon initial hiring, every three years or as requested.
TOPICS COVERED:	1. General Telephone Theory 2. Hybrids 3. Transformers/Loading Coils 4. Telephone Line Characteristics 5. Maintenance Telephones 6. Emergency Telephones 7. OPL/PABX Telephones 8. Red/Green/Yellow/Black and Mine Telephones 9. PBN's 10. Networks 11. Telephone Test Equipment 12. Common Battery 13. Local Battery 14. CB/LB Interface 15. MT Switchboard 16. ET Console 17. TTB Equipment 18. Signaling 19. Dials 20. E-M Trunk Signaling 21. Troubleshooting Telephone Systems
COURSE LENGTH:	Forty (40) Hours (May be taught in full length or modular form)

TITLE: 4. BART DIGITAL TRANSMISSION SYSTEM

OVERALL OBJECTIVES: To assure that Communications Electronic Technicians (CET's) maintain an acceptable level of knowledge in the proper maintenance and repair of the BART Digital Transmission System.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids visual inspection of actual equipment and limited hands-on application.

EXAMINATION: Written examinations covering BART's Digital Transmission System, its functions and troubleshooting.

TARGET AUDIENCE: Communications Electronics Technicians (CET's) assigned to the Communications Section.

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. General Considerations of the Digital Transmission System (DTS)
2. Review of Digital Logic
3. Functions of the Digital Transmission System
4. Block Diagrams of the DTS
5. Identification of the Components of the DTS
6. DTS Interface
7. DTS Test Equipment
8. DTS Troubleshooting
9. DTS Documentation
10. DTS Circuit Analysis
11. DTS Safety Precautions
12. Failsafe
13. Lost Interupt
14. Work "31"
15. DTS Modems
16. DTS Backup Panel
17. DTS Backup Lines
18. DTS Key Functions
19. DTS Addressing
20. DTS Word Format

COURSE LENGTH: Forty (40) Hours (May be taught in full length or modular form)

TITLE: **5. BART K-24 CARRIER SYSTEM**

OVERALL OBJECTIVES: To assure that Communications Electronic Technicians (CET's) maintain an acceptable level of knowledge in the proper maintenance and repair of the BART K-24 Carrier System.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids visual inspection of actual equipment and limited hands-on application (first week).

Field training (Task Training Week) in a field environment with the instructor directing terminal/repeater measurement/adjustment for the first night. The envolvement of the instructor will be on a diminishing basis as the week progresses.

EXAMINATION: Written examinations covering BART's K-24 Carrier System, its functions and troubleshooting.

TARGET AUDIENCE: Communications Electronics Technicians (CET's) assigned to the Communications Section.

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. General Considerations of "Carrier" Systems
2. Type of "Carrier" Systems
3. Modulation Systems
4. Block Diagrams of the K-24 System
5. Modulation Plan
6. Frequency Conversion
7. Balanced Modulators/Demodulators
8. System Block Diagrams Including Signaling
9. Module Block Diagrams
10. Alarm Systems
11. Power Systems
12. Power Feed System
13. Repeater Block System
14. Repeater Slope and Span Pads
15. Circuit Analysis of Modules
16. Repeater/Amplifier Pad Calculations
17. Test Equipment

COURSE LENGTH: Forty (40) Hours Classroom
Forty (40) Hours Task Training
Eighty (80) Hours Total (May be taught in full length or modular form)

TITLE: 6. ELECTRONIC KTS TELEPHONE SYSTEM

OVERALL OBJECTIVES: To assure that Communications Electronic Technicians (CET's) maintain an acceptable level of knowledge in the proper maintenance and repair of the Electronic KTS Telephone System.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids, available documentation and spare parts.

Part of this training will be conducted on-site at both Central and the Toll Test Board Room.

EXAMINATION: Written examinations covering the Electronic KTS Telephone System, its functions and troubleshooting.

TARGET AUDIENCE: Communications Electronics Technicians (CET's) assigned to the Communications Section.

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. ITT MKS131 System Block Diagrams
2. Station Equipment
3. Line Equipment
4. Intercommunications Equipment
5. Common Equipment
6. Power Supplies
7. Documentation
8. Strapping Options
9. Safety Considerations
10. System Troubleshooting
11. Data Transmission

COURSE LENGTH: Twenty (20) Hours (May be taught in full length or modular form)

TITLE:	7. THIRD RAIL POWER TRIP SYSTEM
OVERALL OBJECTIVES:	To assure that Communications Electronic Technicians (CET's) maintain an acceptable level of knowledge in the proper maintenance and repair of the Third Rail Power Trip System.
COURSE FORMAT:	Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids, visual inspection of actual equipment and limited hands-on application.
EXAMINATION:	Written examinations covering the Third Rail Power Trip System, its functions and troubleshooting.
TARGET AUDIENCE:	Communications Electronics Technicians (CET's) assigned to the Communications Section.
CYCLE:	Upon initial hiring, every three years or as requested.
TOPICS COVERED:	1. Operations Rules and Procedures 2. Rail Trip System Configuration 3. Interface with DTS 4. Relay Controls 5. Traction Power 6. Troubleshooting Procedures 7. Troubleshooting Exercises 8. Safety Precautions 9. Analysis of Past Incidents
COURSE LENGTH:	Sixteen (16) Hours (May be taught in full length or modular form)

TITLE: 8. WORKMANSHIP

OVERALL OBJECTIVES: To assure that Communications Electronic Technicians (CET's) maintain an acceptable level of knowledge in proper Workmanship Procedures and practices.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids, and actual chassis construction techniques in a work area.

EXAMINATION: Written examinations covering workmanship practices and standards.

Student-assembled chassis are inspected for workmanship and quality control standards as applicable to BART.

TARGET AUDIENCE: Communications Electronics Technicians (CET's) assigned to the Communications Section.

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. Crimping
2. Wire Wraps
3. Soldering
4. Component Mouting
5. Component Marking
6. Hardware Installation
7. BART Quality Standards
8. Construction Documentation

COURSE LENGTH: Sixteen (16) Hours (May be taught in full length or modular form)

TITLE: 9. BART POLICE RADIO SYSTEM

OVERALL OBJECTIVES: To assure that Communications Electronic Technicians (CET's) maintain an acceptable level of knowledge in proper maintenance and repair of the Police Radio System.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids, and some hands-on application.

EXAMINATION: Written examinations covering the BART Police Radio System, its functions and troubleshooting.

TARGET AUDIENCE: Communications Electronics Technicians (CET's) assigned to the Communications Section.

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. Security Radio Base Stations and All Associated Equipment
2. Station Antennas and Feed Arrangements
3. BPS Console and All Associated Equipment
4. Radio Test Equipment
5. Keying Systems
6. System Troubleshooting
7. Module Adjustment
8. Adjustment of a Base Station Transmitter
9. FCC Documentation
10. Safety Procedures
11. Clearance Procedures
12. Audio Adjustments

COURSE LENGTH: Forty (40) Hours (May be taught in full length or modular form)

E. ELECTRICIANS

TITLE: 1. ELECTRICAL COMPONENT FAMILIARIZATION AND BASIC PROCEDURES

OVERALL OBJECTIVES: To assure that Electricians maintain an acceptable level of knowledge in proper maintenance and repair of BART's Electrical Power Systems.

COURSE FORMAT: Classroom and field familiarization is utilized along with handouts, visual aids, and some hands-on application.

EXAMINATION: Written examinations covering the basic Electrician Procedures for maintaining BART's Electrical Power System.

TARGET AUDIENCE: Maintenance Electricians

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. BART Operations Rules and Procedures as they apply to Electricians (orange book)
2. BART Electrification Plans (red book)
3. BART's Safety Tagging System
4. 1KV DC, 34.5 KV AC, Rectifier and Breaker Safe Clearances
5. Introduction to BART Electrical Prints and Documentation
6. BART's Substation Rectifier System Familiarization Monitoring Devices and Safety
7. BART's Substation Transformer System Familiarization, Monitoring Devices and Safety
8. 34.5 KV DC Switchgear Maintenance and Operation
9. 1 KV DC Switchgear Maintenance and Operation
10. Safe Substation Battery Charger Maintenance and Operation
11. Substation Battery System Maintenance and Operation

COURSE LENGTH: Forty (40) Hours (May be taught in full length or modular form)

F. TRAIN CONTROL ELECTRONICS TECHNICIANS (TCET's)

TITLE: 1. SWITCH MACHINE TRAIN CONTROL EQUIPMENT

OVERALL OBJECTIVES: To assure that Train Control Electronics Technicians (TCET's) maintain an acceptable level of knowledge in proper maintenance and repair of Switch Machines and their associated equipment.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids, and some hands-on application.

EXAMINATION: Written examinations covering Train Control Switch Machines, their functions and troubleshooting.

TARGET AUDIENCE: Train Control Electronics Technicians (TCET's) assigned to the Communications Section.

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. Basic Hardware Layout
2. Component Parts of Track
3. GRS Model 55 Switch Machine
4. GRS Speed Frater Switch Machines

COURSE LENGTH: Twenty-Four (24) Hours (May be taught in full length or modular form)

TITLE: 2. INTERLOCKING TRAIN CONTROL EQUIPMENT

OVERALL OBJECTIVES: To assure that Train Control Electronics Technicians (TCET's) maintain an acceptable level of knowledge in proper maintenance and repair of Interlocking equipment.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids, and some hands-on application.

EXAMINATION: Written examinations covering Train Control Interlocking Equipment, their functions and troubleshooting.

TARGET AUDIENCE: Train Control Electronics Technicians (TCET's)

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:
1. System Introduction
2. Basic Theory of Train Control Interlocking
3. Interlocking Documentation
4. Basic Relay Logic Circuits
5. Interlocking Logic
6. Power Distribution
7. Preventive Maintenance and Acceptance Tests

COURSE LENGTH: Fifty-Six (56) Hours (May be taught in full length or modular form)

TITLE: 3. MULTIPLEX AND SPEED ENCODING (MUX) TRAIN CONTROL EQUIPMENT

OVERALL OBJECTIVES: To assure that Train Control Electronics Technicians (TCET's) maintain an acceptable level of knowledge in proper maintenance and repair of MUX equipment.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids, and some hands-on application.

EXAMINATION: Written examinations covering Train Control MUX Equipment, its functions and troubleshooting.

TARGET AUDIENCE: Train Control Electronics Technicians (TCET's)

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. System Introduction
2. Basic Timing Unit
3. Station Speed Encoding Unit
4. Wayside Multiplex System

COURSE LENGTH: Eighty (80) Hours (May be taught in full length or modular form)

TITLE: 4. NON-INTERRUPTIBLE POWER SYSTEMS (N.I.P.S.) TRAIN CONTROL EQUIPMENT

OVERALL OBJECTIVES: To assure that Train Control Electronics Technicians (TCET's) maintain an acceptable level of knowledge in proper maintenance and repair of N.I.P.S. Systems.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids, and some hands-on application.

EXAMINATION: Written examinations covering Train Control Non-Interruptible Power Systems, their functions and troubleshooting.

TARGET AUDIENCE: Train Control Electronics Technicians (TCET's)

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. System Introduction
2. Lead-Acid Batteries
3. Westinghouse Single-Phase Battery Chargers
4. Westinghouse Three-Phase Battery Chargers
5. Westinghouse 1 to 10 KVA Inverters
6. Westinghouse High Power Inverters

COURSE LENGTH: Eighty (80) Hours (May be taught in full length or modular form)

TITLE: 5. AUTOMATIC TRAIN CONTROL OPERATION (ATO) EQUIPMENT

OVERALL OBJECTIVES: To assure that Train Control Electronics Technicians (TCET's) maintain an acceptable level of knowledge to proper maintenance and repair of ATO Train Cont. Equipment.

COURSE FORMAT: Classroom setting, instructor-delivered instruction, supplemented with handouts, visual aids, and some hands-on application.

EXAMINATION: Written examinations covering the Train Control Automatic Train Operation System, its functions and troubleshooting.

TARGET AUDIENCE: Train Control Electronics Technicians (TCET's)

CYCLE: Upon initial hiring, every three years or as requested.

TOPICS COVERED:

1. System Introduction
2. Interfacting Equipment
3. Performance Modification and Dwell Time
4. Transmitting I.D. to Train
5. Program Stop and I.D. Transmit
6. I.D. Processors
7. Destination Sign Logic
8. ATO Documentation

COURSE LENGTH: Eighty (80) Hours (May be taught in full length or modular form)

CHAPTER V CERTIFICATION PROCEDURES

GENERAL PROCEDURES

CALIFORNIA PUBLIC UTILITIES COMMISSION (C.P.U.C.)
SEVENTH INTERIM ORDER

The California Public Utilities Commission (C.P.U.C.) issued its Seventh Iterim Order, dated May 15, 1977 which, among other things, required the District to establish training, testing and certification programs for personnel whose duties may affect the safety of passengers, employees or equipment. It further required the District to submit to the C.P.U.C. within three months, a specific implementation plan for training and testing programs and certification requirements. In October of 1977 (revised in May 1981), the District issued its C.P.U.C. Certification Plan which specified in some detail how the District would comply with C.P.U.C. Interim Order Seven. The Plan was subsequently approved by the C.P.U.C.

In general, the Plan indicates that all personnel in specific classifications shall be trained and tested by means of classroom, simulation and On-The-Job (OJT) training methods, in five (5) major areas:

a) District Operations Rules and Procedures

b) Safety regulations pertinent to the skill

c) Applicable departmental regulations and procedures

d) Specific job functions and ability to perform specific job functions

e) Impact of the employee's actions on safety

Certification and recertification of Central Control Power/Support Controller and Central Train Controllers is currently conducted by the Field Services Department. All other certification and recertification is conducted by the Department of Employee Relations, Training Division.

Specific classifications covered are:

1. Computer Technicians
2. Traction Power Electricians
3. Communications, Revenue Vehicle and Train Control Electronic Technicians
4. On-Rail Equipment Operators
5. Station Agents
6. Tower Supervisors (Foreworkers)
7. Line Supervisors (Foreworkers)
8. Train Operators
9. Transit Vehicle Mechanics

The numbering of personnel in those classifications totals about 1200 employees or 55% of the District's workforce of approximately 2200 employees.

The certification process is divided into two phases: Initial certification, generally given to newly hired or promoted personnel in the above classifications, and recertification, given to those employees on a two or three year cycle thereafter.

District employees required to be certified and recertified must participate in training programs and successfully pass written and performance examinations and an identified OJT Training process. Employees not meeting certification requirements cannot perform the function being certified according to both Interim Order Seven and the C.P.U.C. Certification Plan filed in October 1977 (revised May 1981).

Specific certification curriculum content for Maintenance classifications are selected from the existing Maintenance course curriculum byy appropriate Maintenance management personnel.

APPENDIX B

BART PRIVATIZATION PROGRAM

(TO BE PROVIDED FOLLOWING ADOPTION BY THE BART BOARD OF DIRECTORS)

APPENDIX C

BART E&H PROGRAM

BAY AREA RAPID TRANSIT DISTRICT
A PROGRAM FOR MASS TRANSPORTATION SERVICES FOR HANDICAPPED PERSONS

APPLICABLE TO BART EXPRESS BUS AND SHUTTLE SERVICES

A Program submitted to UMTA as
required by Part 27 of Title 49,
Code of Federal Regulations, Subpart E
in compliance with Final Rule, May 23, 1986

FINAL REPORT

June 1987

BAY AREA RAPID TRANSIT DISTRICT
A PROGRAM FOR MASS TRANSPORTATION SERVICES FOR HANDICAPPED PERSONS

ABSTRACT: The Bay Area Rapid Transit District (BART) operates a 72-mile, 34-station, electric-powered rapid rail transit system in the San Francisco Bay Area. The rail service is fully accessible to handicapped persons. Certification of accessibility most recently occurred during the UMTA Triennial Review completed in November 1985. As an adjunct to the accessible rail system BART operates by contract an express bus and shuttle system that provides accessible feeder bus service for the general public (see Figure 1). BART is a recipient of UMTA Section 3 and 9 funds and is therefore required by Part 27 of Title 49, Code of Federal Regulations, Subpart E (commonly known as UMTA 504 regulations) to submit to UMTA a program describing a full performance level of service for handicapped persons, a public participation process (including public comments on the program) and documentation of program costs as they apply to the Express Bus and shuttle services.

BART is pleased to report that its contracted bus system meets the full performance level (FPL) of services specified in Section 27.95 of Subpart E and that BART intends to maintain that level of service in the future. In the area of public participation BART has an active Elderly and Handicapped Task Force and BART staff interact regularly with local individuals and groups representing various segments of the handicapped community. BART is committed to maintaining a close association with this community in the future. Finally, although BART's budget does not specify a line item for the costs of accessible services it is estimated that BART spends approximately 1.7% of its accessible bus service operating costs for the provision of accessibility.

SECTION I of this report describes the criteria for scheduled accessible bus systems at the FPL, the provision of services included in existing bus service contracts and the public participation process present and future. Public comments and responses to significant comments required by Section 27.83 of Subpart E are included in SECTION II of this program report. SECTION III specifies program expenditures.

The public comment period for this report was from March 15, 1987 to May 15, 1987. The program public hearing took place on May 15, 1987.

SECTION I

Criteria for Accessible Systems at the FPL and Provision of Service

A. Express Buses - BART's Express Bus service was initiated in December 1974 to serve areas in Alameda and Contra Costa Counties not initially served by the rail system. The service was intended to provide feeder bus service in prospective BART rail extension corridors. The service is currently operated by AC Transit under contract to BART, is available to the general public and is fully accessible to those in wheelchairs. It consists of 12 routes in 4 major corridors (South, Central, East and West). Service in the corridors operates 7 days each week. Service hours are generally 5:00 a.m. to midnight on weekdays and Saturdays, and 9:00 a.m. to midnight on Sundays and holidays. Headways are generally 30 minutes on weekdays during the midday and commute periods, and 60 minutes during evenings, weekends and holidays. Fares are 75¢ for adults plus 40¢ per additional zone, and 15¢ for seniors, handicapped people and children plus 15¢ per additional zone (children under 5 are free). BART's Express Bus services meet the criteria for scheduled accessible bus systems for hours and days of service, service area and fare as specified in Subpart E, Section 27.95(c).

The current contract for Express Bus services includes performance standards for meeting schedules, and for maintaining the buses and handicapped lift assemblies in proper operating condition. Table 2 presents a quarterly system performance evaluation for FY 84-87 as reported to BART by AC Transit. In nearly every quarter the schedule, maintenance and lift operation goals were met. The contract provisions require that all buses used in this service be equipped with wheelchair lifts, that back-up equipment be available when necessary, that drivers and other line personnel be properly trained and supervised in the operation of all equipment and can provide assistance and transit information. Additional assistance and information are available at the rail station origin of each route. It is BART's intention to ensure that these service provisions be maintained in all future Express Bus service contracts. The service provisions described in the foregoing paragraphs meet the requirement listed in Subpart E, Section 27.87.

A more detailed description of the corridors and routes is shown in Table 1, and Figures 2 through 5.

B. AirBART Shuttle Bus - Shuttle service began in 1977 as a joint BART/Port of Oakland three-year demonstration project to provide feeder bus service between the Oakland International Airport and the Coliseum/Oakland Airport BART Station. This service, which is currently provided by the Port of Oakland through contract with a private bus company, is available to the general public and accessible to those in wheelchairs. BART pays 50% of the operating costs after fares are deducted. The service consists of 2 radio-equipped mini-buses which exchange positions at the end points on approximately ten minute intervals. The service operates seven days a week from 6:00 AM to midnight Monday through Saturday and 9:00 AM to midnight on Sundays. Fares are $1.00 for adults and 50¢ for seniors, handicapped patrons and children. Handicapped accessible service is available on one of the two buses. BART is in the process of renegotiating the contract to include incentives for vehicle maintenance, increasing patronage and the level of accessibility. This shuttle service meets the criteria for scheduled accessible bus systems for hours and days of service, service area and fare as specified in Subpart E, Section 27.95(c).

The bus operator has additional vehicles available for back-up service when necessary, drivers are trained to operate the vehicle and lift equipment properly and public assistance and transit information is provided by BART and the Port of Oakland at the end points of the route.

A detailed description of the route is shown in Figure 6. The service provisions described in the previous paragraphs meet the requirements listed in Subpart E, Section 27.87. It is BART's intention to ensure that these service provisions be maintained in any future shuttle bus service contracts.

C. Loma Ranger Shuttle Bus - Shuttle service began in October 1982 as a demonstration project to provide feeder bus service between the Mira Loma residential area of San Francisco and Glen Park BART Station. The service is currently provided by BART through a contract with a private bus company. Although the service is available to the general public, present patronage is low (approximately 100 passenger trips per day) and there have been no requests for wheelchair accessible service. Consequently, the service is not wheelchair accessible. MUNI (San Francisco Municipal Railway), however, provides wheelchair accessible service to this area via Routes #43 - Masonic and #44 - O'Shaughnessy. Further, the area is within the San Francisco paratransit district.

The Loma Ranger service consists of 2 vans which operate during the commute periods (6:00 am to 9:00 am and 4:00 pm to 7:00 pm) Monday through Friday. One-way fares are 30¢. BART is in the process of re-evaluating the service to determine if the current method of funding should be changed or if the service should be terminated. Any changes to the existing service will require a public hearing separate from those required in Subpart E, Section 27.83a3. During the public hearing process for BART's Program for Mass Transportation Services and the public hearing regarding possible changes to the Loma Ranger service no requests were received to provide accessible service to local residents. Although this service is not accessible it never the less complies with Subpart E, Section 27.95(c)(2)(ii).

Public Participation

Handicapped Access Committees and Councils

BART maintains regular contact with groups representing the handicapped community in several ways. BART has an active Elderly and Handicapped Task Force (approximately 20 regular members) which meets monthly and is staffed by at least one BART employee. Appendix A includes a list of community organizations which participate in the Task Force. The Task Force was formally recognized by the BART Board of Directors in 1975 and currently provides advisory recommendations on every aspect of handicapped issues including but not limited to system access and employment. The Task Force has been briefed on the 504 program requirements, is regularly consulted on provision of accessible transportation services, and commented twice on BART's Program for Mass Transportation Services (March 17, 1987 and April 21, 1987). BART is committed to maintaining the Task Force not only to comply with 504 regulations but more importantly to continue its close association with the E&H community and provide accessible transportation services to all segments of the community.

In addition to the Task Force, BART staff is integrally involved and participates in monthly meetings of the Regional Transit Association of the Bay Area Accessibility Committee (comprised of staff from all major Bay Area transit agencies) and the Alameda and Contra Costa County Paratransit Coordinating Councils (PCC's). The Councils are comprised of community representatives, local and regional elderly and handicapped organizations and government agencies providing services to the handicapped community. All of these groups are consulted regularly on handicapped transportation services and commented on BART's program during the public comment period.

The Task Force and the PCC's will be available in the future to provide continued public participation in BART's accessible bus programs. Any substantial changes to the existing services would be reviewed by the aforementioned groups and individuals. Such proposed changes are also subject to public hearing.

SECTION II

Comments Received on the Draft Program

BART Elderly and Handicapped Task Force Meeting (March 17, 1987)

Comment

1. **Maggie Dee Dowling** - If BART's contract with AC Transit is terminated as privatization is pursued, when will that occur and how will it effect the accessibility of bus services?

Response

BART is currently evaluating the privatization issue. BART will ensure that future Express Bus service contracts maintain accessibility standards at least as stringent as the existing service levels in compliance with Part 27 of Title 49, CFR, Subpart E, regardless of operator(s).

Comment

2. **Maggie Dee Dowling** - Many of the bus stops and bus shelters are not fully accessible to wheelchairs. How can that be responded to in BART's program?

Response

Bus stops and bus shelters are not the property of or provided by BART. These facilities are the property of local agencies and are located within local agency rights-of-way. Through the planning process BART will, however, continue to work with local agencies, including local transit service providers, to design and construct more accessible stop locations.

Contra Costa County Paratransit Coordinating Council March 30, 1987

Comment

3. Does BART have any bus passenger statistics that can be incorporated into the report?

Response

The data below shows total Express Bus patronage by corridor (rounded to the nearest hundred) for the year April 1986 through March 1987. Express Bus contractor AC Transit estimates that wheelchair-using patrons comprise approximately 0.02% of the total riders, or about 20 trips per month.

	Route			
Month	D	M/P	Q/J	U
Apr 1986	20100	45400	35100	43200
May	22000	49000	36500	45000
Jun	19200	45500	32100	43200
Jul	19300	44000	23400	44000
Aug	23000	45500	30000	41500
Sept	20500	43000	30500	40500
Oct	20000	46500	34000	41000
Nov	19000	44500	29500	39500
Dec	20000	46000	34000	41000
Jan 1987	20000	44500	29000	41500
Feb	16500	39500	24000	33000
Mar	19000	46000	31800	41400

Alameda County Paratransit Coordinating Council (April 14, 1987)

Comment

4. **Michael Pachovas** - Does BART plan to link up with both Oakland and San Francisco International Airports? Also, are the hours of bus operations the same as BART train operations?

Response

In addition to regularly scheduled AC Transit services, BART presently supports an accessible link between the BART Coliseum/Oakland Airport Station and Oakland Airport via the AirBART shuttle. San Mateo County Transit (SamTrans) provides accessible bus service between BART's Daly City Station and San Francisco Airport.

In general, the hours of BART Express Bus operations are the same as BART rail operations, that is, nominally 6:00 a.m. to midnight.

Comment

5. **D. Nunn** - Does BART prepare a 504 program for BART rail, and if so, when is it submitted to UMTA?

Response

Rapid rail transit is subject to a set of accessibility regulations different from those governing bus transit. BART certifies its compliance with those requirements during the UMTA Triennial Review process. The last such certification occurred in 1985.

BART Elderly and Handicapped Task Force Meeting (April 21, 1987)

Comment

6. **Hale Zukas** -
   a. The costs for the Central Corridor compared to the costs for the East Corridor were inconsistent. Possibly a mistake was made in generating these numbers.
   b. Costs shown on page six were not the real costs of accessible services, but rather the total costs for bus services. Mike Cole seconded Mr. Zukas' comments and stated that the costs shown in the report would give people a false impression of the true costs of accessible service. Other members of the Task Force concurred and suggested that the report be amended accordingly.

Response

a. Mr. Zukas' comment was correct; an error was made in the presentation of cost information by corridor. Corridor-level cost information is no longer included in the Final Report.
b. The expenditures section of the report has been amended to include the incremental cost of accessible services based on data received from AC Transit.

Dublin Public Input Meeting (April 22, 1987)

Comment

7. Susan Bruestle (LAVTA) -
    a. What is the correlation between on-time performance and the number of roadcalls?
    b. What are the numbers of boardings for handicapped patrons by route and location?
    c. Why does the South Corridor show decreasing costs in the expenditure table?

Response

a. There is no direct correlation between on-time performance and the number of roadcalls. In the J, Q and U corridors back-up equipment is quickly available if a roadcall occurs thereby minimizing deviation from schedules. In the D, M and P corridors there may be a greater tendency to miss scheduled arrivals and departures as a result of a roadcall, due to the greater distance between these corridors and back-up equipment.

b. This level of information is unavailable from BART's various bus service contractors. Express Bus contractor AC Transit estimates that wheelchair-users account for about 20 trips per month systemwide.

c. The data shown on page six incorrectly linked corridors and respective expenditures. The corrected data indicates that the South Corridor has minor increases in costs for the three years shown, while the Central Corridor has decreasing costs. Decreasing costs in the Central Corridor are a result of service steamlining in that corridor. Corridor-level cost information is no longer included in the Final Report.

Contra Costa County Paratransit Coordinating Council (April 27, 1987)

Comment

8. How do BART and AC Transit share the description of Express Bus services in their respective 504 programs?

Response

Since BART provides 100% funding of the Express Bus service, BART is responsible for submitting the program describing these services in compliance with UMTA guidelines.

Pittsburg Public Input Meeting (April 29, 1987)

Several residents from the Stoneman Village residential complex in Pittsburg, California presented the following comments:

Comment

9. Lights are out at night and phone vandalized frequently at the Bailey Road Park/Ride. Also, phone vandalized frequently at the Hillcrest Park/Ride. Requests additional security be provided.

Response

A field check of the Bailey Road and Hillcrest Park/Ride lots was made recently in response to this comment. No vandalization was found. Local police are available to respond to vandalism complaints as they are reported. BART Maintenance provides timely repair of the results of vandalism.

Comment

10. Questions the validity of the performance figures in Table 2 of the report, i.e. maintenance of lifts and roadcalls. Also, heaters not used/do not operate in winter and air conditioning units not used/do not operate in summer.

Response

The performance figures presented in Table 2 are provided by AC Transit through its computerized maintenance system. "On time performance" is recorded by bus drivers on their daily route sheets and is defined as arriving at and departing from the designated BART station within five minutes of the scheduled time. Unusual circumstances such as weather, road conditions, delayed train arrivals or other conditions beyond the control of the bus driver are not counted in meeting the performance goal.

"Roadcalls" are defined as any mechanical breakdown that requires supervisor or maintenance staff assistance, or the removal of a bus from service.

"Working Wheelchair Lifts" is defined as the successful operation of a lift for a wheelchair patron or a successful test by the bus driver. Because actual Express Bus wheelchair patronage is low (approximately 20 trips per month) the performance number primarily reflects the percentage of successful tests by the driver.

BART receives few complaints regarding non-functioning heating and air conditioning systems.

Comment

11. Express Bus does not meet FPL for the following reasons
    a. Lifts do not operate all the time.
    b. Lifts do not accommodate all wheelchairs/scooters.
    c. Seat belts fail to operate most of time.
    d. Not all drivers are properly trained in the operation of lift equipment.
    e. Some drivers refuse to operate lifts.
    f. Some drivers do not report operation problems on the road or in the yard.
    g. "Accessible" stops are not all fully accessible, i.e.:
        - terrain problems
        - lack of curb ramps
        - uneven and broken sidewalks
        - broken glass
        - inappropriate placement of shelters
    h. Street travel is necessary to get to many bus stops
    i. Disrepair of bus stop shelters
    j. Lack of shelters
    l. Drivers often resent having to operate lifts

Response

This comment reflects the opinion of the commentor(s). No bus service can be expected to operate completely trouble-free, and the situations identified in this comment do occur periodically. BART's evaluation, however, concludes that the Express Bus system meets the FPL specified in the UMTA guidelines.

Comment

12. BART transit information
    Operators are uninformed regarding location of bus stops, unfamiliar with the geography of the service area, and no local T.D.D. BART information is available.

Response

BART will address these comments by providing more accurate descriptions of bus stop locations for transit information operators and by posting a T.D.D. BART information telephone number at bus stops and bus shelters, as feasible.

Comment

13. New bus drivers are unfamiliar with the service areas and with routing, and depend on BART route maps which are not detailed. It was suggested that drivers should ask passengers if they need assistance.

Response

This comment will be transmitted to BART's bus service providers.

Comment

14. a. Schedules are hard to read because of bad coloring, low contrast and small print.
    b. Schedules and public notices are seldom available on-board buses.
    c. Schedules refer to a numbered bus stop location, rather than a specific place.
    d. Greater frequency is needed during school hours.

15. Bus Stops
    a. Some bus shelters are not accessible to wheelchairs and do not meet California Access Standards Code Title 24 (re: placement of shelters).
    b. Bus stop signs are too high off the ground to be read, print is too small, and coloring is too difficult to read. It was suggested that maps and schedules should be clearly and securely displayed at all park/rides and that the number of bus stops along Willow Pass Road be increased.

Response to 14 and 15

BART will review reported schedule and bus stop problems with the BART Elderly and Handicapped Task Force and implement changes as appropriate and feasible.

Comment

16. Questions validity of budget numbers in draft report. Requests a second draft for public review and comment.

Response

The expenditure discussion in the report has been reviewed by BART staff and amended as necessary.

Comment

17. AC Transit buses used in place of BART-painted Express Buses; confusion to riders.

Response
BART staff has reviewed this condition with AC Transit representatives. At times AC Transit buses are the only accessible buses available as back-up equipment.

Comment
18. Bus headers signs indicate opposite directions in continuous message, are hard to read for low-vision and semi-literate patrons, and roll messages too quickly.

Response
BART staff is currently working with AC Transit staff to remedy this problem.

Comment
19. At BART stations patrons who are blind have inadequate guides to station from bus.

Response
BART will review this situation with the BART Elderly and Handicapped Task Force in order to assess the feasibility and potential benefit of possible solutions.

Comment
20. Policy for off-loading bus passengers is incorrect. It was suggested that non-wheelchair patrons should exit to the rear to allow wheelchair passengers and on-coming passengers use of front door.

Response
This comment will be transmitted to BART's bus service providers.

Comment
21. The existing design of the Bailey Road Park/Ride lot is damaging to buses because of the driveway drain gutter, because of conflict with cross traffic and there are no curbcuts on north or south side of driveway sidewalks at the entrance.

Response
BART staff is aware of the design problems at the Bailey Road Park/Ride lot and is in the process of evaluating and correcting these issues.

Pinole Public Input Meeting (April 30, 1987)

No public attendance.

BART Public Hearing (May 5, 1987)

BART staff presented those public comments that had been received to date.

Comment
22. **Hale Zukas** - Reiterated his comment that the costs for the Central and East Corridors seemed to be in error and reported that AC Transit had incremental cost data for the provision of accessible bus services that should be

incorporated into the BART program in place of the bus expenditures shown on page six of the BART report.

Response
See responses to comment No. 6, page II-2.

BART received three letters with comments on BART's program. See pages II-8 through II-12.

23. Response to Maggie Dee-Dowling, letter dated May 5, 1987.

Ms. Dowling's comments reflect various problems with accessible Express Bus services that she had previously presented at the Pittsburg Public Input Meeting (April 29, 1987). Response to this letter is hereby incorporated as response to Input Meeting comments. Please see pages II-3 through II-6.

24. Response to City of Berkeley Transportation Commission, letter dated May 12, 1987.

Response to the comment in paragraph one covered in the response to comment No. 10. Please see page II-4.

Response to paragraph two is covered in the response to comment No. 6 and the Report has been amended accordingly. Please see page II-2.

Response to paragraph three: the accessibility of the BART system is reviewed regularly with UMTA. Additionally, BART continually tries to remedy the types of problems identified by this comment and works directly with the Elderly and Handicapped Task Force to evaluate accessibility improvements and make recommendations to the BART Board.

25. Response to Regional Center of the East Bay, letter dated May 19, 1987.

Response to paragraph two: During renegotiation of the AirBART Shuttle contract, BART will evaluate whether the current level of accessible service is adequate to meet the demand.

Response to paragraph three: Some clarification may be needed in regards to the Loma Ranger service. The Loma Ranger Shuttle does not service San Francisco International Airport (SFO). The Loma Ranger Shuttle only services a small residential community within San Francisco during weekday commute periods. SamTrans links BART's Daly City Station with San Francisco Airport (see response to comment No. 4, page II-2).

390 E. Leland Rd. #345
Pittsburg, CA 94565
May 5, 1987

Mr. Phil Ormsbee,
District Secretary
Bay Area Rapid Transit District
800 Madison Street
Oakland, CA 94604-2688

Dear Mr. Ormsbee:

This letter is in response to the Bay Area Rapid Transit District's draft presented to the public for its review regarding, "A Program for Mass Transportation Services for Handicapped Persons, a program submitted to UMTA as required by Part 27 of Title 49, Code of Federal Regulations, Subpart E in compliance with Final Rule, May 23, 1986.

Good fortune, Harley Goldstrom, a BART staff person from the Planning Department met with Patti Wright and myself on April 24, 1987 at 10:30a.m.. The purpose of Goldstrom's trip to the "East Corridor" was to get first hand experience of the reported problems which occur here.

Mr. Goldstrom missed his first connecting bus to Pittsburg due to lack of transfer time. As though my prayers were answered Mr. Goldstrom ran into each and every one of the problems which exist in the East Corridor. Mr. Goldstrom is the author of the draft I am responding to in this letter.

We got under way shorthly after he arrived. We pointed out inappropriate bus shelters, inaccessible urban bus stop areas, dangerous shelter constructions, bus stop signs which were placed to high and otherwise barely readable, inappropriate bus schedules for the low visioned, and poor color choice for the same target group of transit dependent. His first hand experience with the drivers who were not trained well on lift operations or lifts that had to be cycled multiple times before our boarding or egressing was another bright spot on an otherwise long 6½ hours tour.

BART bus drivers who are unfamiliar with this area are given a BART bus schedule map and told to "wing it" a supervisor said. We find stops are missed this way leaving handicapped passengers to wait for 30 minutes until the next bus arrives. We have severe weather conditions in the East Corridor and this is a disservice to the transit dependents who are handicapped.

While we are promised new seatbelts that work we have not experienced this improvement to date. If the seatbelts do not work then the bus is inaccessible to wheelchair users dispite a 50% chance the lifts work.

I take exception to the A.C. Transit's reported figures that 95 to 98% of the lifts work.

-more-

As luck would have it Mr. Goldstrom discovered several other obstacles/barriers the handicapped community encounter on a daily basis. Headers reflect two different directions at virtually the same time: Pittsburg/Antioch/Concord-BART. When the BART buses pull into the underused Park and Ride lots (East Corridor) we have no idea which direction they have come in from without asking the driver each time.

Because of this Mr. Goldstrom happily got onto the bus going in the opposite direction he intended to go...Brentwood (eastbound) not to Concord BART station(westbound).

A closing parody to Mr. Goldstrom's sojourn was he had missed a BART westbound train due to additional lift problems.

The Baily Road Park and Ride entrance (sidewalk area) outside the BART Park and Ride lot does not have wheelchair curb ramps (curb cuts) thus a person using a wheelchair can not cross at the sidewalk area but rather go up into the Park and Ride lot to cross directly infront of the buses that enter and exit...highly dangerous.

Perhaps a better way to draw up a draft that truely depicts the situation in the East Corridor is to re-write this portion of the draft.

In closing I feel it is vitally important to mention the disservice to the East Corridor totally transit dependent BART shuttle passengers to endure eight lift proceedures round trip due to the latest proposal by Tri-Delta Transit's (at BART's prompting) to offer local bus service when BART plans to "streamline" their services in and out of the East Corridor. No where do you reflect these proposed changes and mention 50% less direct to BART station service. We do not live near the Park and Ride lots. Your draft reflects 30 minute headways in the East Corridor FY 86/87. This is grossly misleading to the UMTA review panelist.

Thank you for this opportunity to comment.

Sincerely,

Maggie Dee-Dowling
Maggie Dee-Dowling
Columnist

cc: Margaret Pryor, Chairperson
Arlo Smith, Member of the BART Board
Mr. Bob Weaver, Editor
Antioch Daily Ledger
Ms Cecie Fontanoza, Director
Calif. Dept. of Rehabilitation
File

City of Berkeley

Transportation Commission
Martin Luther King, Jr.
Civic Center Building
2180 Milvia Street
Berkeley, California 94704

(415) 644-6534
TTY (415) 644-6915

May 12, 1987

Mr. Keith Bernard, General Manager
BART
800 Madison Street
Oakland, CA 94607

Attention: Harley Goldstrom, Planning Department

Dear Mr. Bernard:

The Transportation Commission of the City of Berkeley has reviewed BART's Program for Mass Transportation Services for Handicapped Persons and has grave concerns regarding the program as written.

First, the report seems to indicate that there are no problems with the service given that the lifts work 99% of the time, therefore there are no corrective measures planned. The use of the 99% figure is simply irresponsible, since anyone with any knowledge or experience with the situation knows better. One frequent user of the service puts the figure at about 50%. These figures raise the question as to how records are kept; is there a sample taken or are all cases recorded and how reliable are the figures?

Second, Section 27.99 of the 504 regulations require that only costs directly attributable to accessibility be counted, but the report lists the costs of the entire bus operation. Since AC Transit has estimated the accessibility related costs for its own program, obtaining the proper cost figures for the BART contract service should not be difficult.

Finally, although we understand that this report only addresses the bus service , part of providing an accessible transit system is to have adequate access between the buses and the rail line. This includes appropriate curb cuts, shelters, access to the station, elevators in good operation, access to elevators. This is not addressed in this report nor is it adequately addressed in BART's Draft 5 Year Plan.

Transportation Commissioners appreciate the opportunity to comment on this document and look forward to a response to their concerns.

Sincerely,

Sylvia G. Toth

Sylvia G. Toth
Secretary

cc: City of Berkeley Council Members
    Hal Cronkite, City Manager
    Vicki Elmer, Assistant City Manager
        Planning and Community Developement
    Metropolitan Transportation Commission

RCEB
REGIONAL CENTER OF THE EAST BAY

2201 BROADWAY OAKLAND, CALIFORNIA 94612-3402

(415) 451-7232 TTY: (415) 763-2910

May 19, 1987

Howard L. Goode
Department Manager
Planning, Budget and Research
800 Madison Street P.O. Box 12688
Oakland, CA 94604-2688

Dear Howard:

As a Resource Developer of the Regional Center of the East Bay which serves 7,000 clients and being involved as a transportation liaison, one of our priorities is to assist our clients in living as independently as possible. It is understandable then, that transportation plays a major role in this philosophy. One of the main task of the RCEB is to advocate in this role therefore, assisting our clients in reaching this goal.

In reading your draft report, I have made some observations that I would like to make some comments on. In regards to your Air Bart shuttle service to the Oakland Airport, this service should be fully accessible. Having one of the two vans accessible, is not sufficient. I urge BART to have vans equipped with working lifts as soon as possible. The reasons for this are that people flying with electric wheelchairs have to go through a great amount of hassle, due to FFA regulations on batteries. Persons with battery-powered wheelchairs need to be at the airport, at the least. 1 hour prior to flight take-off. This procedure is most time consuming and frustrating, this involves disconnecting the battery for flight preparation. This also holds true for the persons coming back. You never know what is going to happen to your chair on a flight. Therefore, having proper transportation available is not a luxury, it is a necessity.

As for Loma Ranger Shuttle service, this service should be fully accessible as well. Just because you have never had any request for this servicd, that does not mean that it is not needed. Getting back and forth from the San Francisco Airport is a nightmare for anyone on a wheelchair. More than likely the reason why you haven't had anyone request that line to be made accessible, is that the line has not been made known to the disabled passengers.

Serving the developmentally disabled in Alameda and Contra Costa Counties

I hope these comments will be useful to you in making BART service for everyone as convenient as possible. I look forward to hearing from you if there is any other way that I can help you. Please feel free to contact me at the Regional Center of the East Bay.

Sincerely yours,

Jim Gonsalvez

JM/js

cc: Kathy Fennell
Jose Maltos
Anita Merrill
Area Board V
P.C.C.
M.T.C.

Program Expenditures

The following data identifies total operating expenses for the entire BART system (bus and rail), and the costs for providing Express Bus and shuttle services at the full performance level (FPL). Also included is the annual average operating costs, the three percent (3.0%) limit required by UMTA guidelines and an estimated cost to provide accessible bus servcies. The data is in compliance with requirements under Section 15 of the Urban Mass Transportation Act and Subpart E, Section 27.97 of the current UMTA guidelines.

	FY 84/85 (actual) ($000)	FY 85/86 (actual) ($000)	FY 86/87 (adopted budget) ($000)
Total Operating Expenses	147,144.5	160,893.5	174,456.6
Annual Average Operating Costs (1984 to 1987)	- - - - - -	160,831.5	- - - - - -
3% of Annual Average	- - - - - -	4,824.9	- - - - - -
Total Express Bus Services Billings	7,275.7	7,579.4	8,099.4
AirBART Shuttle Service Billings	51.5	109.9	156.3
Loma Ranger Shuttle Service Billings	63.6	64.5	70.0
Total Bus Services Billings	7,390.8	7,753.8	8,325.7
BART's cost for providing accessible services estimated at 1.7% of Express Bus & AirBART operating costs[1]	125.6	131.8	141.5

Alternatives Considered

Section 27.85 (a3) of Subpart E requires documentation of the cost(s) of alternatives considered during program preparation. BART is currently evaluating the feasibility of providing Express Bus services through the private sector. As of the preparation of this program report, BART staff has not completed its study and projected service costs are not available. Any future changes to the Express Bus service would require public hearings and BART would follow the public process outlined in Section 27.83 of Subpart E.

---

[1] 1.7% is the figure determined by AC Transit to be the incremental cost of providing accessible bus services. No comparable figure is available from the operator of the AirBART Shuttle. Since the AC Transit contract accounts for over 98% of BART's bus expenditures, however, BART has adopted the 1.7% figure as an approximation of the incremental cost of providing accessibility on all of its bus service.

TABLE 1

EXISTING EXPRESS BUS SERVICE

SOUTH CORRIDOR

EXPRESS BUS SERVICE DESCRIPTION	PP	MID	EVE	SAT	SUN	TT	COMMENTS
U Route: Hayward BART, Pleasanton, Livermore; local service	30	60	60	30	60	55	29 stop locations, all buses are handicapped accessible
UL Route: Express service Bayfair BART to Livermore	30	60	--	--	--	50	9 " "
UP Route: Express service Bayfair BART to Pleasanton	30	--	--	--	--	40	18 " "

CENTRAL CORRIDOR

EXPRESS BUS SERVICE DESCRIPTION	PP	MID	EVE	SAT	SUN	TT	COMMENTS
D Route: Walnut Creek BART to Stoneridge via Dublin; local service				45-60	45-60	61	57 stop locations, all buses are handicapped accessible
DX1 Route: Walnut Creek BART to Stoneridge via Dublin freeway route express service with some local stops	30	30	60	--	--	40	34 " "

EAST CORRIDOR

EXPRESS BUS SERVICE DESCRIPTION	PP	MID	EVE	SAT	SUN	TT	COMMENTS
ME Route: Concord BART to Martinez via Highway 4; local service	30	--	60	60	60	40	10 stop locations, all buses are handicapped accessible
PE Route: Concord BART to Pittsburg and Antioch via Highway 4 express with some local stops	15	30	--	--	--	45	20 " "
PE1 Route: Concord BART to Brentwood; local service	30	60	--	--	--	90	70 " "
P2X Route: Concord BART to Brentwood via Highway 4; local service	--	--	60	60	60	90	89 " "
PEX Route: Concord BART to Hillcrest Park/Ride in Antioch via Highway 4; express service	45-60	--	--	--	--	40	4 " "

WEST CORRIDOR

EXPRESS BUS SERVICE DESCRIPTION	PP	MID	EVE	SAT	SUN	TT	COMMENTS
J Route: El Cerrito del Norte BART to Rodeo via Highway 80; local service	30	--	--	--	--	40	27 stop locations, all buses are handicapped accessible
Q Route: El Cerrito del Norte BART to Pinole via Highway 80; local service	30	30	60	40	--	30	22 " "

PP = Peak period (6:00 a.m. - 9:00 a.m., 4:00 p.m. - 7:00 p.m.)
MID = Mid-day
EVE = Evening (7:00 p.m. - 12:00 midnight)
SAT = Saturday
SUN = Sunday
TT = Travel times

All times in minutes

TABLE 2

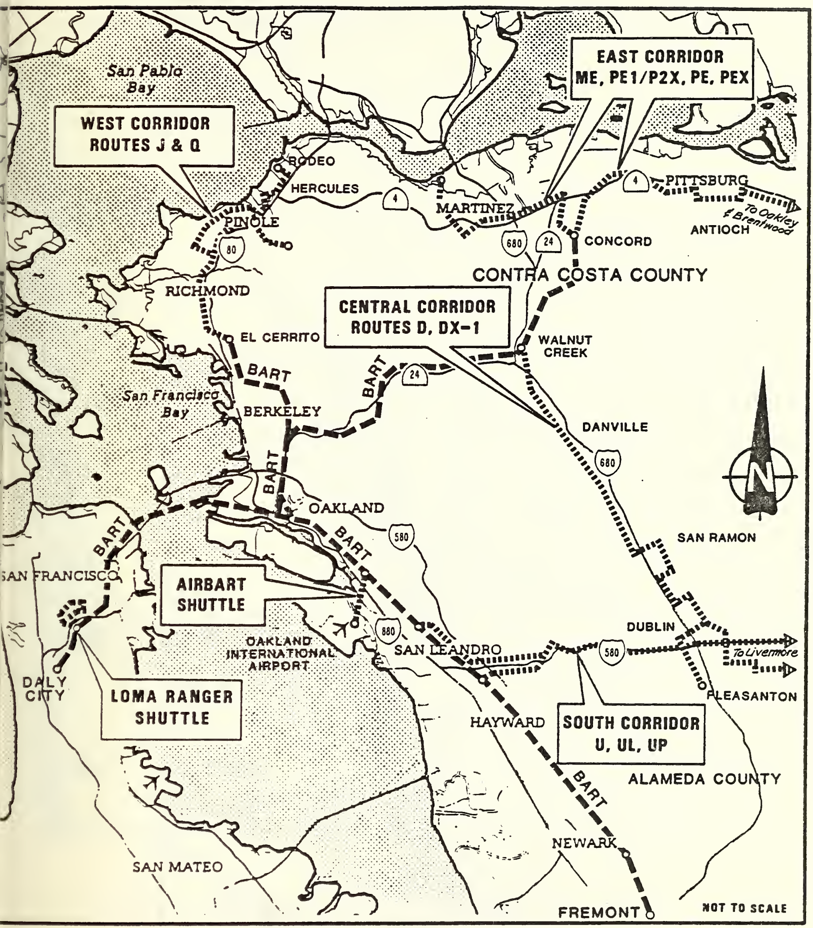
SYSTEM PERFORMANCE - EXPRESS BUS

		ON TIME PERFORMANCE			ROADCALLS			% WORKING WHEELCHAIR LIFTS			% WORKING HEATE AIR CONDITIONI		
QUARTER		GOAL[1]	ACTUAL	ACHIEVED	GOAL[2]	ACTUAL	ACHIEVED	GOAL[3]	ACTUAL	ACHIEVED	GOAL	ACTUAL	ACHIE
1st	-	-											
2nd	84/85	95	96.25	Yes	9000	23,828	Yes	95	98.94	Yes	95	99.20	Yes
3rd		95	97.38	Yes	9000	31,670	Yes	95	99.64	Yes	95	99.80	Yes
4th		95	97.43	Yes	9000	32,745	Yes	95	99.85	Yes	95	98.99	Yes
1st	85/86	95	97.81	Yes	9000	31,394	Yes	95	99.50	Yes	95	99.07	Yes
2nd		95	96.25	Yes	9000	23,828	Yes	95	98.90	Yes	95	99.20	Yes
3rd		95	96.13	Yes	9000	24,920	Yes	95	98.70	Yes	95	99.30	Yes
4th		95	97.90	Yes	9000	9,169	Yes	95	98.60	Yes	95	99.60	Yes
1st	86/87	95	98.20	Yes	9000	7,412	No	95	99.60	Yes	95	99.60	Yes
2nd		95	98.30	Yes	9000	9,624	Yes	95	99.90	Yes	95	99.90	Yes

1) Goal = percentage of on-time performance that buses arrived at their destination within 5 minutes of the scheduled time.

2) Goal = the minimum number of miles between roadcalls.

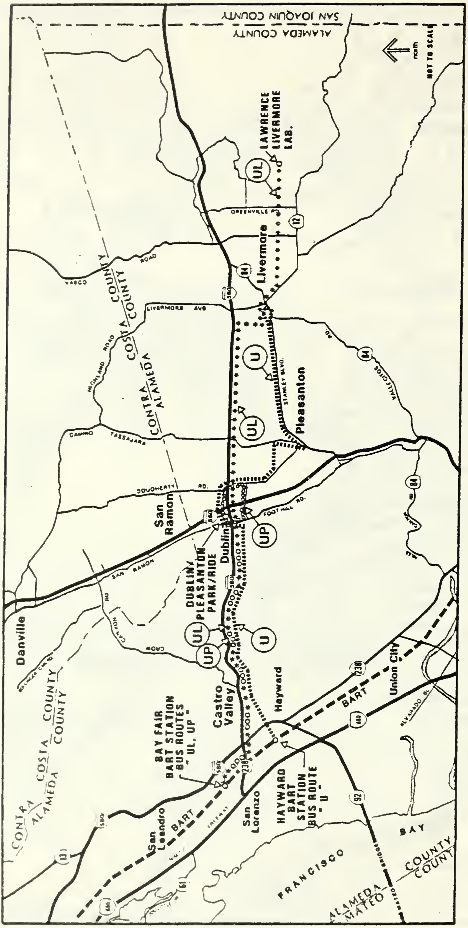
3) Goal = percentage of total times operated that the lift was successfully used by wheelchair patrons or tested by bus operator.



BART SHUTTLE AND
EXPRESS BUS SERVICES

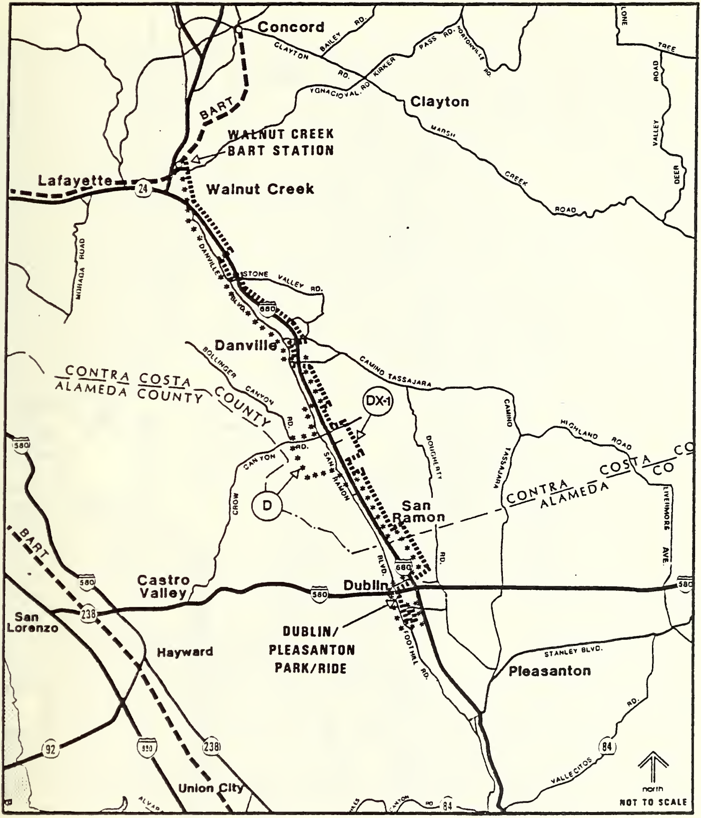
JUNE 1987

FIGURE 1



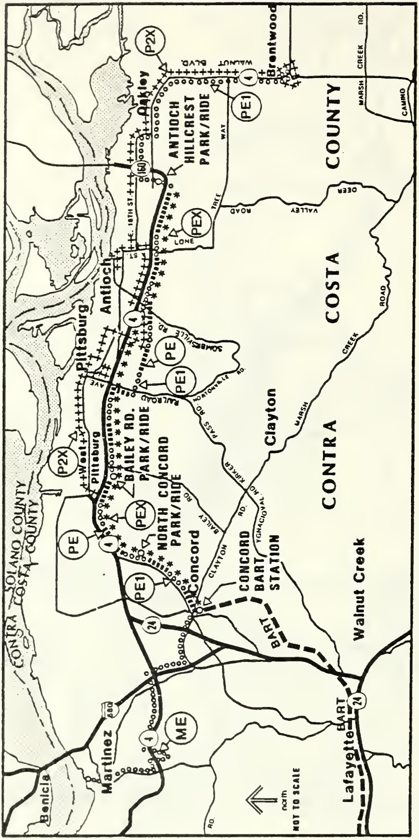
BART EXPRESS BUS SERVICE
SOUTH CORRIDOR
ROUTES " U, UL, UP "

FIGURE 2



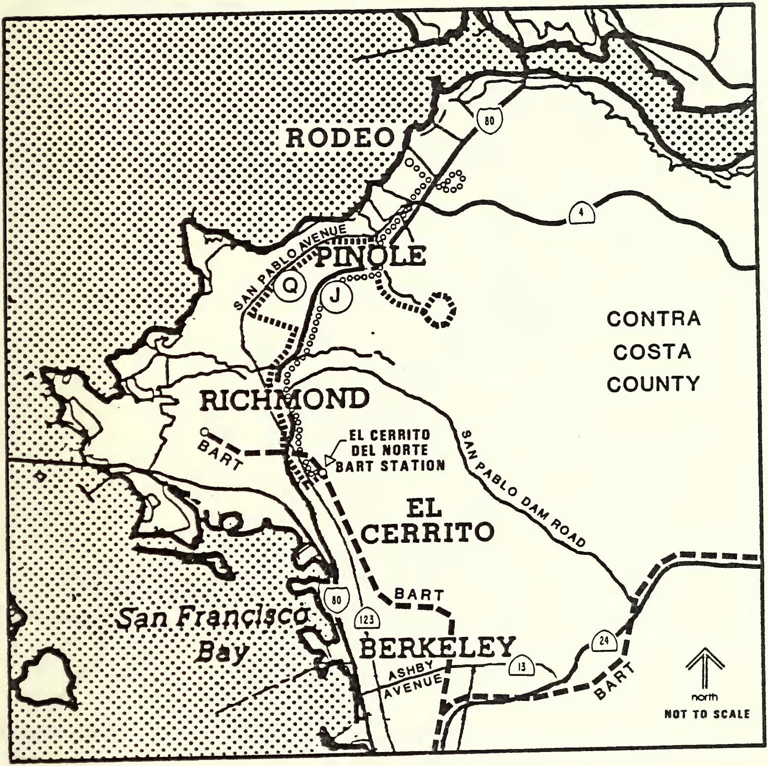
BART EXPRESS BUS SERVICE
CENTRAL CORRIDOR
ROUTES " D, DX-1 "

FIGURE 3



BART EXPRESS BUS SERVICE
EAST CORRIDOR
ROUTES " ME, PE1/P2X, PE, PEX "

FIGURE 4

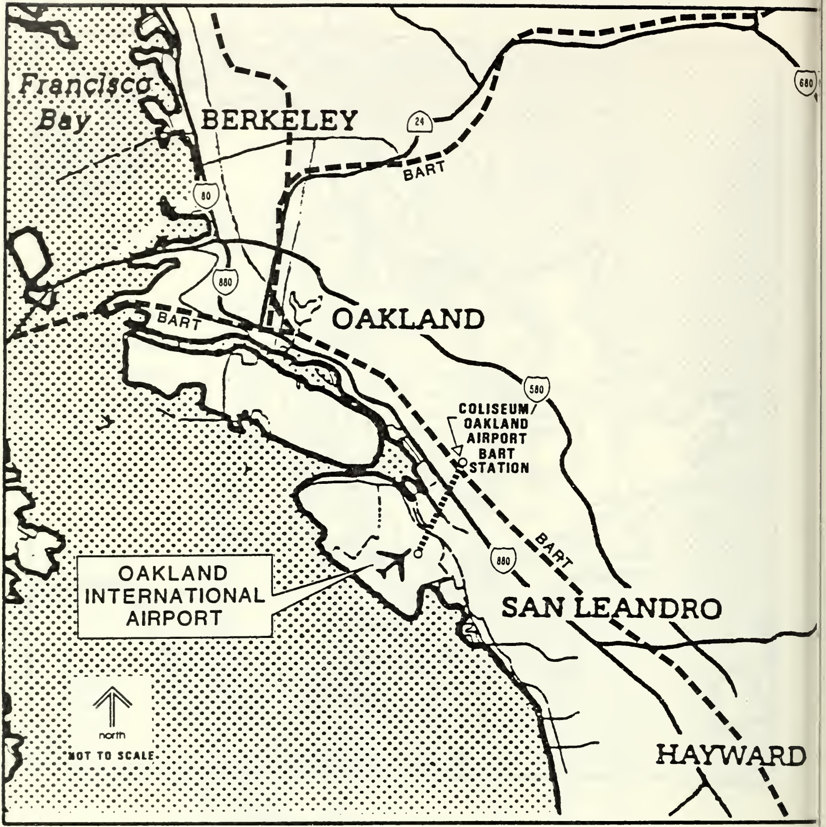


BART EXPRESS BUS SERVICE

WEST CORRIDOR

ROUTES " J and Q "

FIGURE 5



BART SHUTTLE SERVICE
" AIRBART "

FIGURE 6

APPENDIX

A. BART Elderly and Handicapped Task Force
   (organizations represented)

B. Report Credits

BART
ELDERLY AND HANDICAPPED
TASK FORCE
(organizations represented)

Living Skills Center for the Visually Handicapped
2444 Road 20, No. C-105
San Pablo, CA 94806

Department of Rehabilitation
39190 State Street
Fremont, CA 94538

Department of Rehabilitation
2720 Taylor, Suite 420
San Francisco, CA 94133

Department of Rehabilitation
3350 McArthur Boulevard
Oakland, CA

California Association of the Deaf
17201 Via Estrella
San Lorenzo, CA 94580-2705

Regional Center of the East Bay
2201 Broadway
Oakland, CA 94612

Assoc. for Educ. & Rehab. of Blind
2444 Road 20, No. C-105
San Pablo, CA 94806

Cal. Assoc. Orientation & Mobility
2444 Road 20, No. C-105
San Pablo, CA 94806

Office for Civil Rights-Dept. HSS
50 United Nations Plaza
San Francisco, CA 94102

California School for the Blind
500 Walnut Avenue
Fremont, CA 94536

World Institute on Disability
2801 Milvia Streeet
Berkeley, CA 94703

Disabled Students Office
California State University
Hayward, CA 94542

Metropolitan Transportation Commission
101 Eighth Street
Oakland, CA 94607

The Lighthouse for the Blind
1155 Mission Street
San Francisco, CA 94103

Alameda Co. Department on Aging
1234 E. 14th Street, Ste. 207
San Leandro, CA 94578

Coordinator for Blind Services
2516 Channing Way
Berkeley, CA 94720

Center for Independent Living
2539 Telegraph Avenue
Berkeley, CA 94704

Accessible Services Section
AC Transit
508 - 16th Street
Oakland, CA 94612

Hearing Society
1428 Bush
San Francisco, CA 94109

Access California
City Hall, Room 110
One Plaza
Oakland, CA 94612

City of Oakland
Mayor's Commission on Disabled Persons
4099 Howe Street
Oakland, CA 94611

DSH
c/o St. Benedict Center
2891 Bush Street
San Francisco, CA 94115

Deaf/Disability Project
P.O. Box 144
2100 Martin Luther King Jr. Way
Berkeley, CA 94701

Glen Norton
Self Help Hearing Center
1668 Dorchester Drive
Concord, CA 94519

Maggie Dee-Dowling
Tri-Delta Transit Citizen Advisory Council
c/o Pittsburg Post Dispatch
P.O. Box 152
Pittsburg, CA 94565

HOUCHEN
BINDERY LTD
UTICA/OMAHA NE.
2007